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The Supply of Fittings

Settlement of a vexed question

AMONG the papers read at the recent annual conference of the Electrical Contractors' Association was one by Mr. W. Cross on the supply of fittings for electrical installations. The author put forward reasons why fittings were often excluded from installation contracts. Lack of interest on the contractor's part was one. Mr. Cross suggested that the contractor was often content to leave the customer to the manufacturer or his agent instead of making suggestions himself.

Then the manufacturer or wholesaler, he maintained, often approached an architect or purchaser behind the contractor's back and offered a discount. If, however, the Fair Trading Policy was observed the customer could buy as cheaply through the contractor. A third reason was the tendency for fittings, as an integral part of the decorative scheme, to be included in the contract of the shopfitter or decorative specialist. It had been suggested that in such cases the supplier of the fittings should reserve a discount for the fixer.

Under the Fair Trading Policy architects and consulting engineers, who are merely the purchasers' agents, are not entitled to any discount unless their clients are entitled to a users' discount, which, however, is less than the resellers' discount for similar transactions. Mr. Cross maintained that greater satisfaction would be given to all parties concerned in installation work if an agreed discount of, say, half the standard trade discount were paid by the supplier, specialist or purchaser to the electrical contractor.

We published in our issue of July 8th a letter from a lighting fittings manufacturer commenting on the paper. The writer agreed that contractors who rendered service should be remunerated by the division of the manufacturers' discount between them and the suppliers. If a contractor both supplied and fixed the equipment he would, naturally, take the whole amount. It was suggested that 15 per cent. was an equitable figure for fixing.

In the course of the Hastings discussion, Mr. H. T. Young, after saying that the problem was to make a profit when the fittings *were* included in an installation contract, spoke up for the decorative specialist, who, he said, deserved credit for the work which he put in.

Mr. Cross, in presenting his paper, mentioned that the question of discount to shopfitters and decorative specialists was being considered by the Fair Trading Council, and within a short time of that statement the Council has sent us particulars of addenda to the Policy giving it effect, and some details appear in our "Business Notes" section. New clauses are added to the three relevant schedules of the Fair Trading Policy providing that decorators and decorative specialists (whose qualification to be considered as such are defined) shall be given 15 per cent. discount, while the electrical contractor concerned takes 10 per cent. This does not give the contractor the 15 per cent. suggested by our above-mentioned correspondent, nor even the half proposed by Mr. Cross, but at least it recognises that he is entitled to something for his work.

In sending us details of the arrangements, Mr. F. Rogers, the secretary of the Fair Trading Council, says that the clause referring to decorators and decoration specialists will in actual practice, it is thought, only apply to a very few firms who act in a consultative capacity in connection with large decoration schemes. To qualify for a discount they must render service to the supplier in the manner stated, and accept full responsibility for paying for the fittings they order on behalf of their clients. There is no intention, of course, that this clause should apply, in any way, to the ordinary house decorator.

The clause with reference to garages has been introduced mainly for purposes of clarification, for many customers of this type, while having no electrical departments within the meaning of the Policy definitions, stock and resell electrical products for use in motor-car work (such as E.L.M.A. type "B" lamps and ignition flex, for example), and are therefore liable to be confused with *bona-fide* electrical retailers when interpreting the Policy. Under the new clause, garages within the given definition are classified as "recognised users."

Export Activity

THE electrical export figures for the past half-year given in the June Board of Trade return of overseas trade indicate remarkable activity in this branch of the industry during that time. The value of British electrical equipment—excluding turbines, boilers and other plant which is not directly electrical—was £10,705,509. Last year was considered a prosperous one, but in the first half of 1938 there has been a further advance of over £2,000,000 in the value of electrical exports. It is fairly evident that much of the equipment now being exported comprises large plant which must have been ordered many months ago, and some slackening is noticeable in shipments of most types of apparatus, but it is gratifying that even up to June electrical exports as a whole were maintained at a very high level. Their value last month was £1,703,559, an increase of £188,250 above the June, 1937, figure, equivalent to 12 per cent.

Redressing the Balance

WHILE our overseas electrical trade continues to present a satisfactory picture, it is otherwise with trade generally. The balance of imports over exports is still growing, a fact which has led the Federation of British Industries to present a memorandum on the subject to the President of the Board of Trade. Discussing remedies, the F.B.I. dismisses as unsound the possibility of employing the capital resources of the nation to meet the deficit. Something could be done to improve the situation by a more vigorous use of the tariff to control competitive imports, but it is also vitally important that we should use the great lever given us by the large purchasing power of our market to secure more favourable treatment for our export trade. The Federation considers that in all negotiations with countries which send us far more than they buy from us it should be made clear that the basis of any agreement must be reasonable reciprocity. Above all, powers should be taken to check the entry of subsidised goods or goods which are sold at uneconomic prices.

Site Value

A GOOD illustration of the principle that the potential utility of a generating station depends upon considerations such as availability of condensing water and transport facilities rather than upon the performance of its existing plant is provided by the extensions at Portsmouth. Gunwharf Road station was not originally selected for operation under the grid scheme, but was kept running for the time being under a temporary arrangement with the Central Electricity Board. Later, however, it was decided to give it the status of a selected station. While results with the old 250 lb. per sq. in. plant might not have justified the retention of the Portsmouth Corporation station on grounds of thermal efficiency, the capacity of the site to deal with the requirements of a 30,000-kW modern unit with steam conditions of 625 lb. per sq. in. and 850 deg. F., with provision for a second similar set, provides good reason for promotion to the "selected" class.

Callender's and C.P.

FOR some time past rumours have been circulating of arrangements between Callender's and Crompton Parkinson. This week they have proved to be correct; in fact, the "arrangement" is even closer than was anticipated. The plan which shareholders have had placed before them provides for the formation of a holding company to take over the whole of the share capital of the two companies, amounting to well over £3 millions. At the close of their last year Callender's issued capital was £1,923,916, and there was debenture stock of £300,000. Crompton Parkinson had an issued capital of £1,254,783 and a capital bonus amounting to £40,884 was distributed. At the company's annual meeting in December last Mr. Frank Parkinson gave a hint of a development of this nature. Referring to export business, he said:—

> "We are taking an active part in an endeavour to secure a closer degree of co-operation between the principal British manufacturers with a view to obtaining for this country a greater proportion of the available overseas business and on more satisfactory terms."

Similarly, at last month's meeting of Callender's Sir J. Fortescue Flannery (the chairman) referred to the keen competition in the cable-making industry and said that active steps were being taken which, he hoped, would effectively meet that competition. It is emphasised that the "individualities" of the companies will be maintained.

New Darwen Tariff

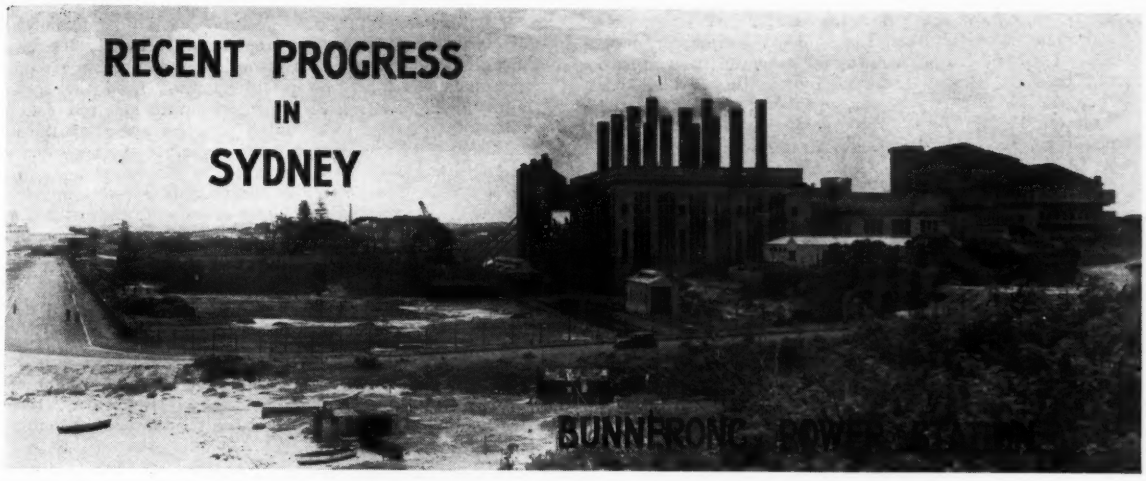
THE new domestic tariff instituted by Mr. F. M. Fletcher, borough electrical engineer of Darwen, at least possesses a certain amount of novelty. Some details of the scale appear in our "Electricity Supply" section, but we may say briefly that it provides a step for every £ of rateable value from £3 to £100 and consists of charging 4d. per unit for a certain quantity, rising with the rateable value, and summer and winter rates of $\frac{3}{8}$d. and $\frac{1}{2}$d. for the remainder of the consumption. Mr. Fletcher claims that the new method gets over the objections to the ordinary rateable-value system. We agree that a consumer would rather pay for units consumed than a fixed charge—apparently for nothing—but actually the rateable-value basis is still maintained—a basis that the Commissioners' Committee on tariffs considered defective, recommending the size-of-house system of assessing the fixed charge. In the Darwen scale we think that the rise towards the higher rateable values is somewhat steep, which indicates the undesirability of making the fixed charge rise in direct proportion to the rating assessment.

Applied Education

THE educational methods employed by Mr. Wackford Squeers were strictly practical; he had the right principle but he applied it in a questionable manner. This principle, that the best learning is doing, was adopted to good effect by a group of advanced students at the South-East London Technical Institute about two years ago. In a paper read before the Management Summer School held at the Institute last week Mr. T. H. Burnham, A.M.I.E.E., A.M.I.Mech.E., described, with the help of two of the students, how this group went about acquiring the practical experience of forming, financing and managing an industrial company. It was a story of hard work and the overcoming of many unexpected obstacles, but the experience gained has been invaluable, and it looks as though the enterprise, consisting mainly of a plastics moulding business, is achieving success.

Killing the Goose

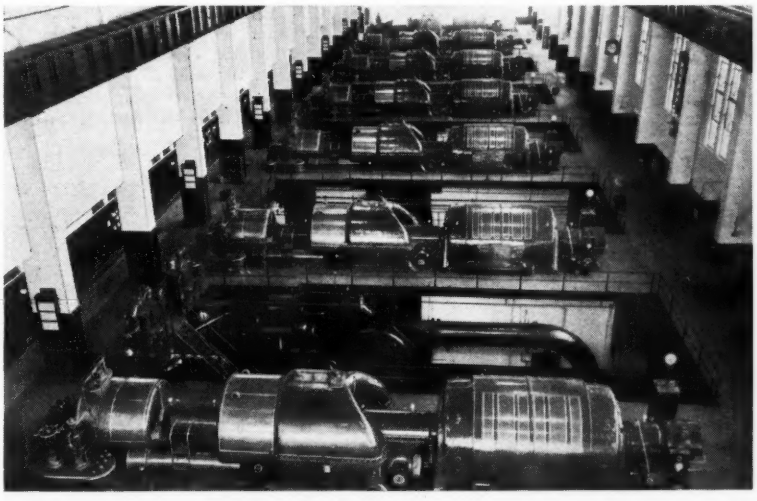
IT appears to be the policy of the Southend Town Council to secure contributions to the rates from the electricity undertaking at any cost. This year a slight deficit is anticipated, but by 1939-40 there should be a small amount on the right side. It will be seen, therefore, that the balance is delicately poised and likely to be upset by any disturbance of existing arrangements. And yet the Council desires to extract a substantial sum regularly from the revenue. This, as Mr. A. C. Johnson, the borough electrical engineer, explains in a report, can only be done by a general increase of 9 per cent. in the charges to the consumers. As these consumers have already contributed an aggregate of £83,000 to the rates, above their ordinary quota as ratepayers, they may feel that this is too much of a good thing and either cut down their consumption or change over to gas—and who can blame them? Unfortunately, Southend is not the only local authority indulging in this questionable practice.



THE Sydney County Council supplies approximately 240,000 customers with electricity in an area of 150 square miles. It also supplies electricity at high voltage to other public supply authorities whose supply areas cover 747 square miles.

Electricity is generated at two power stations, Pyrmont and Bunnerong. The former is situated at the approximate load centre and was laid down in 1904, since when it has undergone several changes. In the years 1921 to 1924 new boiler and turbine plant was installed, raising the installed capacity to 62,500 kW. Now with its installed capacity reduced to 48,000 kW, following the disposal of obsolete plant, it serves as a peak load plant only. Bunnerong, situated on the shores of Botany Bay about ten miles from Pyrmont, is the principal generating station of the system. It was placed in commission in 1929 and by the middle of 1930 the installed generating plant consisted of six Metropolitan-Vickers 25,000-kW turbo-alternators and eighteen Babcock & Wilcox boilers. An additional turbo-alternator delivered in 1931 but not installed until 1937, owing to the falling off in demand, makes the total installed capacity 175,000 kW.

The Bunnerong station generated last year 618,708,800 kWh at a load factor of 50.7 per cent. and with an average heat consumption of 15,648 B.th.u.'s net per kWh. The turbines are designed to operate at a steam pressure of 300 lb. per sq. in. and 700 deg. F. and the boilers are of 120,000 lb. evaporation capacity with Frederick type underfeed stokers. Following the re-establishment of normal industrial and commercial activities in Sydney, plans have been made for the extension of the Bunnerong station by an additional 200,000-kW of generating plant. With the present estimated increase in the system maximum demand it will be necessary to add a 50,000-kW unit in each of the years 1939, 1941, 1942 and 1943. This projected development calls for the retention of the existing plant at Pyrmont for peak load purposes until 1942, when it will be scrapped and possibly a rehabilitation of this station put in hand.



The turbine house at Bunnerong

Extensions at Bunnerong

The extensions to the Bunnerong station now under construction provide for the installation of two 50,000-kW turbo-alternators and four pulverised-fuel fired boilers of 350,000 lb. maximum continuous rating. The turbines will operate at a steam pressure of 600 lb. per sq. in. and at a temperature of 825 deg. F.

Four stages of bleeding are to be used with a final feed-water temperature of 320 deg. F. at the most economical rating of the turbine plant. The turbine and boiler-house plant will be housed in a new block of buildings separated from the existing buildings by a short distance, but the existing circulating water canals, railway sidings and other common facilities will be utilised. The switchgear for the new plant will form an extension to the existing 33,000-V bus-bars, although some rearrangement of the switching arrangements is contemplated.

The following data summarises the principal equipment for the present extensions to the Bunnerong station.

Coal-handling plant: Twin skip hoists, each of 100 tons per hr. capacity, serving twin belt conveyors of similar capacity (International Combustion Co.).

Steam generating plant: Four steam boilers each rated at 350,000 lb. of steam per hr., 650 lb. pressure (gauge) and 850 deg. F.; furnaces of the dry bottom type fitted with Bailey walls, six inter-tube burners and automatic burner lighters; and steel stacks, bunkers and ducting for pulverising mills (Babcock & Wilcox). Furnace ash removal by hydro jet sluicing and fly ash collection system (The Ash Co.). Electrostatic precipitators (Lodge Cottrell). Induced- and forced-draught fans with vane control (James Howden). Safety valves, boiler mountings, &c. (J. Hopkinson, Ltd., & Copes).

Steam turbo-alternators: Two 50,000-kW turbo-alternators, 0.85 power factor, three-cylinder, 3,000 r.p.m., 600 lb. gauge, 825 deg. F., three-phase, 50-cycle, 11-kV, fitted with turning device and complete with all auxiliaries; and two condensate pumps (C. A. Parsons). Two condensers, horizontally divided water boxes, fitted with aluminium bronze tubes; and two sets of feed-heating and evaporating plant (Cockatoo Dockyards, Australia). Four circulating-water pumps of the Vickers-Gill type (Vickers Armstrong, Ltd.).

Feed pumps: Four electrically driven constant-speed pumps, 400,000 lb. capacity (A.E.G. and Weise Sohn-Halle), together with two emergency steam-driven pumps, 600,000 lb. capacity (Weirs).

Pipes, fittings and valves: High-pressure steam and feed piping (Babcock & Wilcox). Electrically operated valves and control stations and manually operated high-pressure feed valves (J. Hopkinson). Low-pressure valves (Blakeborough). Sluice and non-return valves for circulating-water piping (Thompson's, Ltd., Victoria).

Electrical equipment: Four 30,000-kVA generator transformers, 11/33 kV, self-cooled with air-blast cooling above 60 per cent. rating for outdoor installation (Hackbridge Electric Construction Co.). Three 8,000-kVA main auxiliary trans-

formers, 33/3.3 kV, self-cooled, for outdoor installation (Electrical Plant Manufacturers, Ltd.). 33-kV switchgear, metal-clad, of 1,500 and 750 MVA rating for generator, tie and feeder group bus-bars (British Thomson-Houston Co., Ltd.). 3.3.kV switchgear for auxiliary power, metal-clad, 250 MVA rating (Ferguson, Pailin, Ltd.). 440-V auxiliary power switchgear, truck type, air circuit-breakers (Australian General Electric Co., Ltd.).

Distribution Activities

The principal activity in regard to the distribution of electricity has been the conversion of the supply in the centre of Sydney from d.c. to a.c. This is proceeding satisfactorily, and it is anticipated that supply will be completely changed over by 1946, with the exception of certain large d.c. plants in the printing trades.

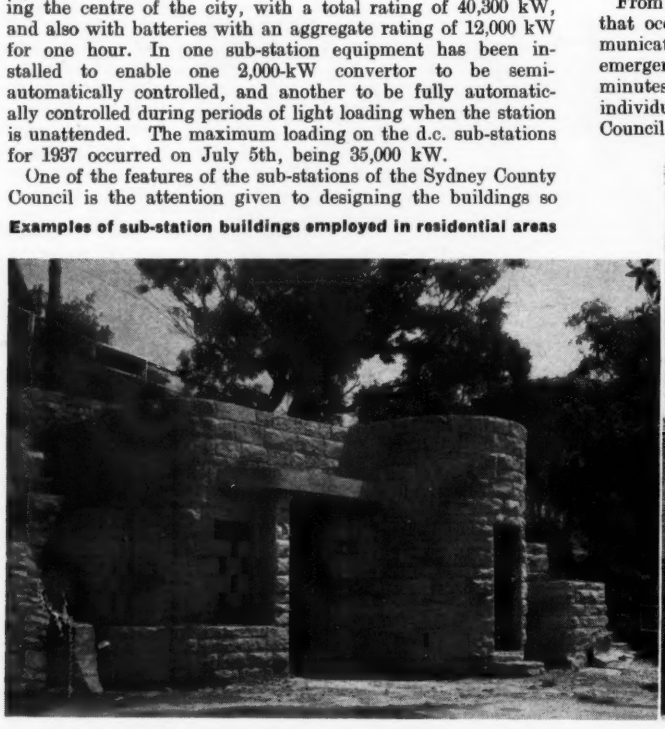
Underground a.c. sub-stations are being installed in the city streets and in the basements of buildings. During 1937 twenty-seven additional a.c. sub-stations were constructed and placed in service. The total rating of such sub-stations at the end of 1937 was 569,450 kVA. In addition to the sub-stations housed in buildings and underground, a number of outdoor sub-stations, pole transformers, ground transformers and kiosks are used as distributing points.

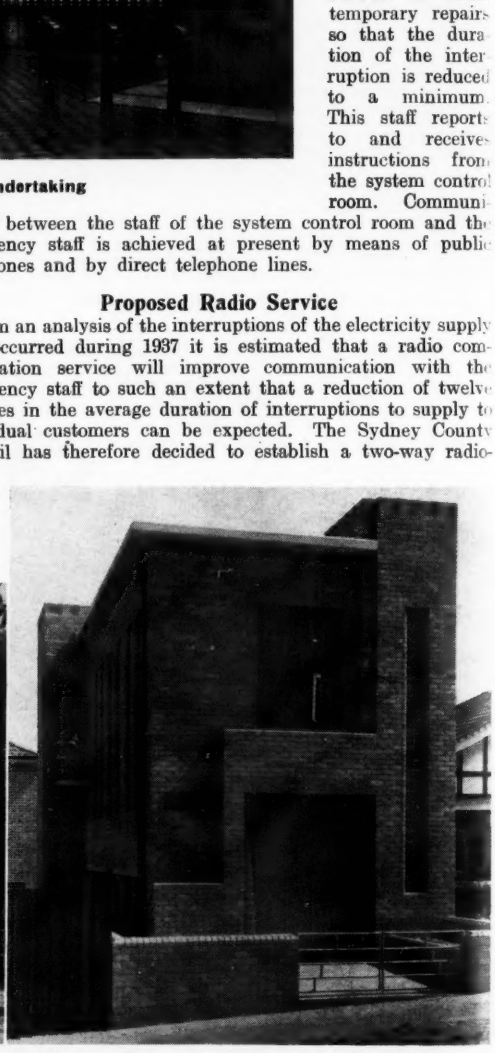
The control room of the undertaking

At the end of 1937 there were five d.c. sub-stations supplying the centre of the city, with a total rating of 40,300 kW, and also with batteries with an aggregate rating of 12,000 kW for one hour. In one sub-station equipment has been installed to enable one 2,000-kW convertor to be semi-automatically controlled, and another to be fully automatically controlled during periods of light loading when the station is unattended. The maximum loading on the d.c. sub-stations for 1937 occurred on July 5th, being 35,000 kW.

One of the features of the sub-stations of the Sydney County Council is the attention given to designing the buildings so that they harmonise with surrounding buildings, particularly in residential areas.

Examples of sub-station buildings employed in residential areas





Control Equipment

All automatic operations of equipment at the large sub-stations connected to the transmission system are signalled to the system control room, situated at the head office in the centre of the city. These operations are signalled by means of lamps and buzzer alarms on a large board on which the transmission system is depicted diagrammatically. The equipment is depicted symbolically, provision being made beneath each symbol for the manual insertion of a plug to indicate the condition of mains and apparatus. Three of the large sub-stations connected to the transmission system are equipped for remote control of essential apparatus from the system control room. The remote control apparatus for each of these sub-stations consists of a control desk for operating the apparatus and an illuminated panel depicting the condition of all mains and apparatus connected to the sub-station. The use of remote control in the operation of sub-station equipment is in its experimental stages at present, and when more experience is gained with the various types of apparatus available, further sub-stations will be equipped.

Interruptions to supply which are caused by the failure of mains and apparatus connected to the Council's transmission system are attended to by a specially trained staff, who are provided with motor vehicles carrying tools and equipment which enable them to effect temporary repairs so that the duration of the interruption is reduced to a minimum. This staff reports to and receives instructions from the system control room. Communication between the staff of the system control room and the emergency staff is achieved at present by means of public telephones and by direct telephone lines.

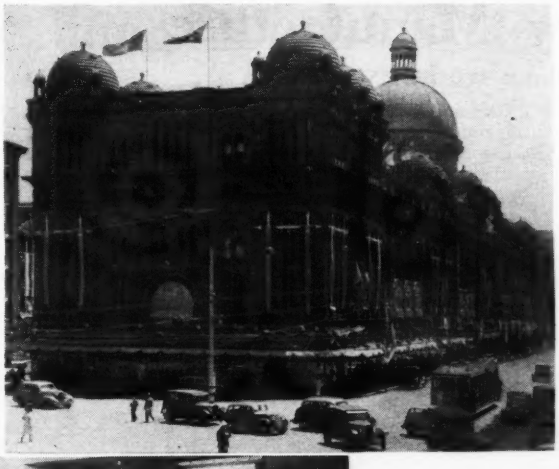
Proposed Radio Service

From an analysis of the interruptions of the electricity supply that occurred during 1937 it is estimated that a radio communication service will improve communication with the emergency staff to such an extent that a reduction of twelve minutes in the average duration of interruptions to supply to individual customers can be expected. The Sydney County Council has therefore decided to establish a two-way radio-telephone communication service between forty-two motor vehicles and the system control room at head office. The main radio transmitter will have a rating of 200 W, and will be situated about fourteen miles from the centre of the city, and will be remotely controlled by the system control room.

To increase the effective range of transmission from the motor vehicles, relay receivers will be installed at certain points of the metropolitan area, and will be connected to the system control room by a land line. Each of the motor vehicles will be equipped with a 10-W transmitter and a receiver operating on fixed wavelengths, and the transmitter will be

equipped with a device for sending two pre-determined telegraphic signals, one to indicate the receipt of the message and the other to request a repetition of the message in cases where atmospheric conditions are such that speech cannot be successfully transmitted from the vehicle.

Mains work during 1937 and the greater part of 1938 was and will be of a routine nature. High-voltage underground cables were installed between new sub-stations and the power station, and it is anticipated that towards the end of 1938 a beginning will be made with the placing underground of the high-voltage distribution in the northern suburbs of Sydney, which is now overhead. This work is expected to occupy from three to four years and when completed will considerably reduce the number of interruptions to supply owing to atmospheric effects on the overhead transmission.



The magnificent headquarters of the Sydney supply authority. Above: Exterior. Left: The consumers' accounts office. Below: Part of the showrooms

Commercial Progress

Electricity generated in 1937 amounted to 623,988,800 kWh, an increase of 11.43 per cent. over 1936. The maximum demand on the system was 164,000 kW and the system load factor 43.4 per cent. Sales totalled 514,092,470 kWh, an increase of 11.44 per cent., and the average price received per kWh sold was 1.272d. (bulk supply, 0.715d.; high-voltage industrial supply, 0.627d.; low-voltage industrial supply, 1.026d.; commercial, 1.644d.; and domestic, 1.812d.). Total revenue was £2,778,084 and expenditure £2,742,668, the capital expenditure up to the end of the year being £19,565,083. The average cost of fuel per kWh sold was 0.164d. During the year the number of consumers connected increased by 3.97 per cent. to 240,083. The average consumption per domestic consumer was 650 kWh.

The highest average price per kWh paid by any one consumer for electricity supplied for other than temporary purposes during the year 1937 was 5d., and the lowest average price paid by any consumer was 0.511d. The latter was paid by a metal melting firm taking supply under special conditions.

The increase in energy sold last year was due in quite an appreciable measure to the activities of the sales organisation of the Council. At the beginning of 1937, the work of the Electricity Sales Branch was carried out on an advisory basis, but following the decision of Council in March, 1937, the principal activity of the Branch was changed to selling. The conduct of the sale of apparatus by the Council during 1937 and to date has been very satisfactory and as a result a marked impetus has been given to the sale of electricity.

Particularly good progress was made in the promotion of the use of electricity for industrial heating, the load connected during the year amounting to 1,970 kW, representing an increase of 37 per cent. over 1936. Notable among many interesting applications of electric heat in industry was its use in furnaces for ceramic firing, annealing, and glass melting, electric steam generators (totalling 670 kW), macaroni drying, banana ripening, &c. Steady progress was also maintained in promoting the use of electric heat for heavy-duty cooking, the load connected by this means amounting to 1,581 kW, an increase in connected load of 5 per cent. over 1936. Of particular interest was the success achieved in the catering field—hotels, bakeries, wholesale pastrycooks, factories, staff cafés in factories and stores and kitchens in colleges and schools.

The Council sells the following apparatus for cash and on long-term purchase: electric ranges, hot-water services, 1½-gal. storage water heaters, wash-boilers, instantaneous water heaters (cash only), special lighting fittings, and industrial heating and commercial cooking equipment. In addition, the Council hires ½-gal. storage water heaters and wash boilers at a small monthly rental. From April 1st, 1937, to April 30th, 1938, the following sales of apparatus were made: 3,260 ranges, 294 hot-water services, 99 1½-gal. storage heaters, 188 wash boilers, 35 instantaneous water heaters. The sale of special "Better Light, Better Sight" fittings was commenced on March 1st, 1938, and up to April 30th, 912 fittings had been sold. The hiring of 1½-gal. storage heaters and wash boilers was commenced on March 14th, and up to April 30th 557 storage water heaters and 87 wash boilers had been hired to residential customers.

The service of the Council is divided into fifteen more or less self-contained branches covering power plant, mains, substations, system operation, meters, testing, installation inspection, workshops, stores, transport, construction, electricity sales, accountancy, audit, and clerical work. The heads of these are directly responsible to the general manager (Mr. H. R. Forbes Mackay) and the chief engineer (Mr. R. Vine Hall).

Lighting Transformers

Another of the series of standards for transformers has been issued, *i.e.*, B.S.S. 794 for low-voltage lighting below 1 kVA rating, for use under such conditions as (i) special risk of mechanical damage or deterioration due to heat or corrosion; (ii) for lighting machines where a special small bulb or reflector is advisable, or, due to vibration, a specially strong filament is required; (iii) where it is desired to minimise danger from electric shock. Such low-voltage lighting is usually between 12 and 50 V and the correct design of the small transformers, generally connected to the 430 or 400-V mains, raises a number of special points which govern the safety of the machine operator and the efficiency of the lighting. The new specification covers sizes, voltages, regulation, &c., and may be obtained from the British Standards Institution, 28, Victoria Street, S.W.1, price 2s. 2d. post free.

Accessory Manufacture

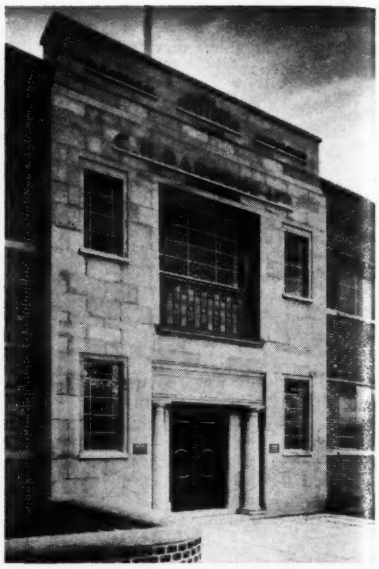
Birmingham works extended

WITH the extensions to the Britannia Works, Tyseley, Birmingham, which were inaugurated by the Earl of Dudley on July 11th, the effective floor space available to C. H. Parsons, Ltd., for the manufacture of their "Britmac" range of accessories has been brought up to 71,000 sq. ft. There is also ample space available on the site for future developments.

Included in the extension scheme, which involved the demolition of the front portion of the factory without interruption of output, is a new administration block in two floors with a 180-ft. facade, the centre portion of which is in reconstructed Portland stone. The steelwork is capable of carrying a further storey. Above the main entrance is a discharge-tube sign outlining "Britmac Accessories" with the company's name.

Two single-storey bays, each 37 by 160 ft., containing the final assembly department form the most obvious feature of the factory enlargement. Running below the whole length of the new bays and three existing bays, is a ground floor basement for housing finished stores and providing accommodation for garages and cycle stores. In addition there is a new plating shop with vats for depositing nickel, copper, chromium and cadmium. Its equipment, including a barrel-plating plant, was made by R. Cruickshanks, Ltd., who also provided several individually controlled motor-driven spindles in the polishing shop, together with modern dust extractors.

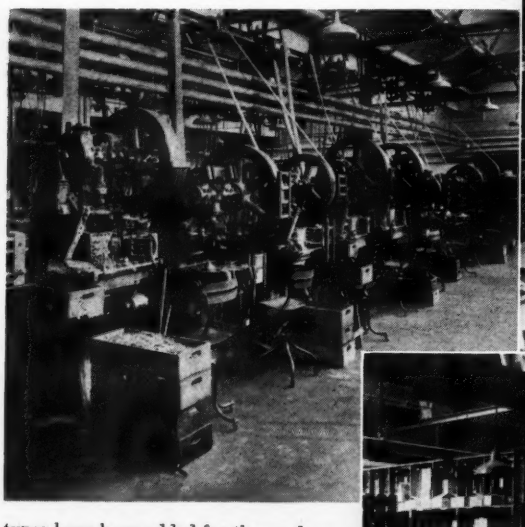
Increasing demands for the ironclad accessories which the company began to make just over two years ago has necessitated trebling the capacity of this section. Several new drilling machines of both forward and reverse and radial types have been added for the production of multi-way gang-control boxes up to 15-A capacity for industrial applications, 5- and 15-A watertight switches with either side-handle or milled-disc operation, in addition to ironclad switch, socket and plug and two- and three-pin switch and socket horizontal and vertical assemblies for industrial and domestic purposes. The company now lists 10,000 items, including the "Little Briton" switches which are claimed to have been the first departure from the standard round pattern.



The handsome centre of the new frontage

Workpeople are provided with "Tansad" or "Evertaut" chairs in line with the general consideration paid by the company to their welfare. For over ten years every employé has received fourteen days' holiday per annum with full pay, and a year ago a five-day week was started with no adverse effects on output or costs of production. Music is provided at intervals by means of B.T.H. sound reproduction equipment. The electrical work of Messrs. C. H. Parsons, Ltd., is almost entirely a post-war development.

Top left: Some of the power presses. Top right: A section of the hand-press shop. Below: A part of the warehouse



Additional milling, engraving, turning, grinding and shaping machines have been installed in the tool room and ¼-in. and 1¼-in. Ward capstans and other automatic machines in the machine shop. A new lacquering shop has been equipped for colouring and stoving small metal components. In the majority of processes each part is examined before being passed on to the next stage, and the completed article is tested for continuity and for insulation with a 500-V Megger and a flash test, usually at 2,000 V, but there are a few specified exceptions in which a lower flash test is applied.

All bench tops are covered with sheet zinc, which reduces wastage of small metal parts, and each bench is sectioned off.

Apart from a range of Admiralty lampholders made during 1917-18, electrical production started in 1919 at the company's former premises and was confined to 5-A switches of the stone-link type and a range of brass lampholders. The number of employés was 20 per cent., and the value of the electrical output less than 10 per cent., of to-day's figures.

The building scheme was personally supervised by Mr. G. B. Handley, the managing director. Mr. H. P. King was the architect. The general contractors were C. Bryant & Son, Ltd., and the electrical contractors Baxter & Impey, Ltd. Gent & Co. supplied the electric clocks and Troughton & Young lighting fittings.

Progress of the Team Valley Estate

Over £1,000,000 has now been spent on land, development and buildings on the Team Valley Trading Estate and seventeen acres of factories have been completed or are under construction. The one-hundredth tenant has recently been secured by the estate company, North-Eastern Trading Estates, Ltd., which has been invited by the Commissioner of the Special Areas to develop industrial sites at Pallion, near Sunderland, at West Auckland and at East Gateshead.

Reconditioning Electrical Equipment

A factory laid out on modern production lines

A FEW years ago Newman Industries, Ltd., initiated a scheme for making available high-class electrical equipment and power plant which could be purchased and installed without the heavier capital necessary for new plant, but which would give much greater satisfaction in service than questionable used equipment obtained from ordinary second-hand plant sources.

It was a bold venture, but one evidently backed with a full appreciation of the problems associated with the manufacturing and production costs of industry, and in many cases it has enabled production schemes to be successfully launched under the keen business competition of recent years. Certainly keen business competition has been one of the strongest factors in the success of what is now a large West of England concern, whose factory at Yate, Bristol, we recently visited so as to be able to impart to our readers some idea of the methods of reconditioning used plant of reputable manufacture to ensure efficiency and reliability for prolonged service.

The power-plant shop—raw material for the reconditioners

We were certainly surprised, for we were not prepared to see a factory which is devoted entirely to the reconditioning of used plant laid out on the lines of a modern works whose sole function is the production of high-grade brand-new equipment, but we soon had to appreciate that the processes involved in both types of factory are largely the same.

Continuous-flow Principle

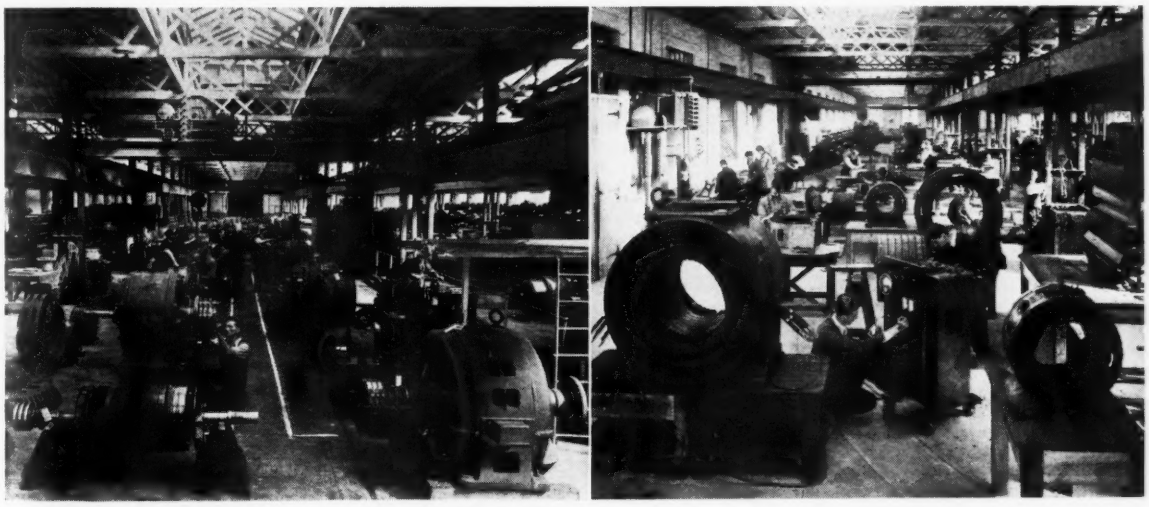
With one outstanding exception, what we actually saw was a factory laid out for production on the modern continuity of flow principle, and this feature is really remarkable, because obviously nothing could be farther from mass production than reconditioning. Our major impression is that within this modern works, which covers over 5 acres and has a pay-roll figure of about 500, the facilities for the supply of overhauled plant are exceptional.

We were conducted through the workshops by the works manager, Mr. W. D. Wilson, formerly of Crompton Parkinson & Co., Ltd., and Bruce Peebles & Co., Ltd., who seems to have developed an uncanny flair for assessing the prospects of new life for used equipment. The extent of the wear on equipment seemed in many cases to be quite a secondary consideration in favour of, say, the type, design, or even the make of the equipment. In our mind this aspect is associated with the outstanding exception to which we have referred, because large numbers of used and obviously worn motors, machine tools, and even heavier equipment, such as turbo-alternators and boilers, as we saw them, certainly do not resemble the raw material found in the normal factory.

Generally, we were struck with the careful planning which has been given so obviously to the layout of each shop, so as to ensure that all the work progresses in the best possible way, and at the same time to ensure the maintenance of personal and close inspection of all the equipment during every reconditioning process. Manual haulage is eliminated in every workshop bay by the installation throughout its entire length of an overhead electric travelling crane, so that the largest machines can be moved with ease and speed. Mr. Wilson is a great believer in the straight-line system of factory process flow, and that belief is certainly well reflected in the flow of machines from the stock racks and bays to the finishing department.

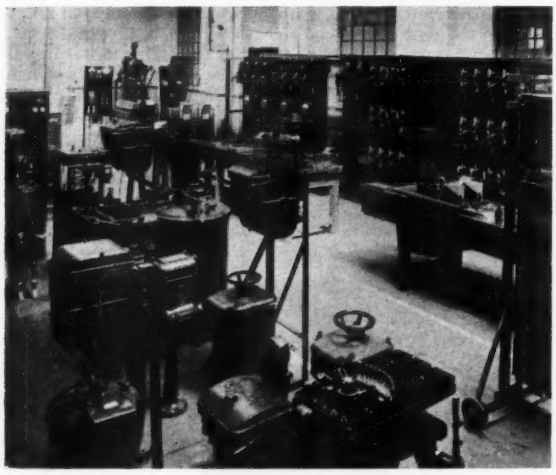
The essentially electrical reconditioning side of the activities is under the personal supervision and control of Mr. A. Watson, formerly general manager of the Phœnix Works of the English Electric Co., Ltd. He told us that the reconditioning of electric motors and generators of all types and sizes forms a major portion of the business, and it was impressive indeed to see literally thousands of machines in row upon row of steel racks in the stock bays, where they are maintained in a clean, dry atmosphere at even temperature.

From the racks the machines are taken to the dismantling



Left: The motor and generator reconditioning bay. Right: Armature winding shop

benches on which they are stripped down. Records are then made of the necessary repairs and of the replacements required. All the electrical insulated parts are carefully cleaned and tested for faults and weaknesses, and when these are found they are fully rectified. The windings are thoroughly cleaned and all traces of grease and oil are removed. They are then dipped in insulating varnish, stoved, and finally coated with



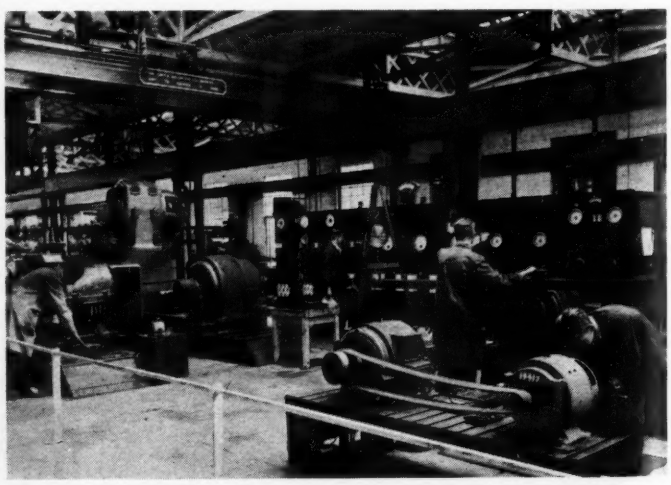
Switchgear erection bay

high-grade finishing varnish to render them impervious to moisture.

The brush gear is completely dismantled, worn or weak springs are replaced, and worn carbons are renewed. In some cases new standard brush holders are fitted. All the commutators are first checked for faulty insulation, then they are tested for rigidity of assembly, and finally they are carefully re-turned. Ring-oiled bearings are checked for fit, and should they show more than a predetermined clearance the bearings are renewed and remetalled. Ball and roller bearings are checked for condition and fit on the shafts and in the housings, and unless they are found to be exact the fits are corrected to the limits recommended by the bearing makers. Where this is not possible new bearings are fitted to the machine.

The carcases, end-plates, and all external parts are scaled, rubbed down, and by spray painting are finished to compare very favourably with new equipment. All these operations are carried out on a flow-sheet manufacturing principle—there are the winding line, the assembling benches, welding bay, and so on, all arranged for the required "production" sequence.

Following these stringent reconditioning processes, all the machines are passed through a separate test department, which is under the control of a test chief responsible only to the management. In this way it is ensured that the complete range of tests is fully carried out, for in the testing of reconditioned equipment lies a responsibility greater than that in connection with the testing of new plant in which the extent of possible manufacturing defects can be pre-assessed with fair accuracy. The tests are adequately designed to prove that all faults—



Test bed for reconditioned plant

dormant or otherwise—have been completely eliminated. Finally, before despatch, a visual examination is made of every machine.

A development of the reconditioning business consists of the redesigning of complete machines, both electrically and mechanically. In most cases this necessitates not only the total stripping out of the coils and rewinding to suit the new electrical conditions, but also the construction of electrically welded fabricated steel bedplates, additional pedestal bearings and shaft extensions. Some of the accompanying illustrations depict large machines being dealt with in this way.

We were particularly interested to see the work in progress on six different sizes of redesigned alternators constructed from suitable mechanical parts of stock machines. Two of these machines are to be used in a large cinema, and they are being built to the specification of a London consulting engineer.

The Newman organisation is apparently well qualified and equipped to design alternators of capacities and voltages to meet specific conditions of use, ranging from plant for industrial purposes to special machines for welding and furnace work.

A substantial demand has to be met for turbo-alternators, vertical steam engine sets and similar plant, and the resources of the company permit the undertaking of contracts for complete installations for electrification schemes for large factories from equipment in stock which includes boilers, generators, control gear and switchboards. An important contract in hand covers the complete electrification of a large Lancashire mill, including the provision of a large turbo-alternator and the complete installation of all the driving motors and their starting gear and main switchboard.

Switchgear Work

A natural development arising from the supply of machines has been the establishment of a switchgear department. Here, in addition to the reconditioning of starting gear required for motors, is a special section wholly engaged in designing and rebuilding switchboards of both the flat-back slate-panel and sheet-steel cubicle types, all equipped with reconditioned apparatus. Such switchboards are built to the specific requirements of each customer and follow recognised principles of good design, construction and finish.

A noteworthy feature of the switchboard construction is that from the large stocks of all kinds of switches and equipment can be selected units with capacities well above the required duties, so that the finished board is of exceptionally robust construction. In actual practice this means long mechanical life, high safety factor and low initial cost.

A 500-kW alternator being redesigned from single-phase to three-phase

We have intentionally confined our attention in the foregoing mainly to the electrical side of the company's activities, but there is also much of electrical interest on the mechanical side. Engines, both steam and oil, of types and sizes up to 1,000 h.p., form an imposing part of the stock, and there are steam-driven pumps and water pumps suitable for electric drives and all manner of other power-house plant.

We are indebted to Newman Industries for permission to view the works and to Mr. Wilson and his colleagues for their help in collecting the above information.

I.E.E. Students' Continental Tour

As we have already reported the I.E.E. Students' Section has arranged a tour on the Continent commencing on July 30th and ending on August 6th. The programme includes a tour of Berlin and visits to the Siemens and A.E.G. works; an inspection of the Krupp works, Essen; and of the Philips Lamp Works, Eindhoven, Holland.

Extensions at Portsmouth

New 30,000-kW set and boiler plant

TOWARDS the end of 1934 the grid scheme for South-West England and South Wales was revised so as to increase the number of selected stations in the area. Among these was the Gunwharf Road generating station of Portsmouth Corporation, and in the following year arrangements were made with the Central Electricity Board for its extension by a 30,000-kW turbo-alternator and two boilers working at 625 lb. per sq. in. and 850 deg. F.

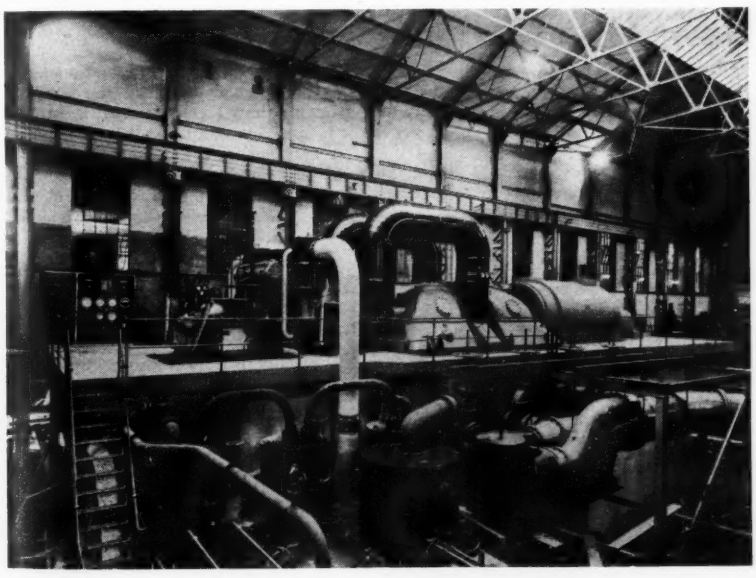
By this extension, which was officially inaugurated yesterday by the Lady Mayoress, Mrs. F. J. Spickernell, the total capacity of the station has been increased to 52,500 kW, the existing plant consisting of five turbo-alternators, two of which are rated at 10,000 kW, and ten boilers, with an aggregate evaporative capacity of 456,000 lb. per hr. at 250 lb. per sq. in., the two largest units of which are rated at 88,000 lb.

The Gunwharf Road power station

The new section is operated independently on the steam side. The temperature of the superheated steam is automatically maintained nearly constant by an "attemperator." Each unit has an evaporative capacity of 150,000 lb. per hr. One of them is fired by a chain-grate mechanical stoker, the other by a retort-type stoker. The chain-grate stoker is built up of 23,700 links and can burn 10 tons of coal per hr. on an area of 342 sq. ft. Each complete boiler weighs 820 tons and its drum is made from a solid forging 4 in. thick.

Integral with the boiler is a "Foster" gilled-tube economiser, above which is a superimposed air heater through which air is forced to the under side of the stoker by 90-h.p. forced-draught fans installed on the fan floor 90 ft. above road level. Flue gases are ultimately discharged to two 200-ft. steel chimneys, with a 2-in. internal coating of gunite, by 145-h.p. scroll-type induced-draught fans, also on the fan floor. These fans are fitted with Tate vane control and, like the 25-h.p. secondary-air fans, are driven by 400-V motors with direct-on starters.

Two of the feed pumps are driven by 500-h.p., 3,000-r.p.m. direct-on started 400-V motors. The third is a steam turbine pump which comes into action automatically in the event of abnormal drop in pressure in the feed system. Each pump has a duty of 300,000 lb. of water per hr. and discharges at 800 lb. per sq. in. to the feed heaters, the water entering the economiser at 330 deg. F.



The new 30,000-kW set, feed heaters and evaporators

The ash from each stoker falls into a hopper at the rear of the boiler and after being automatically quenched by water is discharged on to a continuous belt conveyor from which it is delivered to another belt and carried to the ash yard. There it is dropped into a skip hoist and by this means raised to a 300-ton hopper.

All the soot and grit collected from the boiler passages is withdrawn by a pneumatic suction plant and discharged into a second hopper.

A new travelling jib crane has been installed for handling and reclaiming the coal on an addition to the area of the coal storage yard. This crane can lift 6 tons and can deal with 100 tons per hr. The existing coal conveying equipment has been extended slightly to meet the requirements of the new boilers.

The new turbine, mounted at right angles to the other sets, is a two-cylinder 3,000-r.p.m. machine with twenty-two h.p. stages and seven double-flow l.p. stages exhausting into twin condensers. Stop-valve steam conditions are 600 lb. per sq. in. gauge and 850 deg. F. Steam is bled from four stages for feed-water heating to give a final feed temperature of 330 deg. F. at full load.

An interesting point about the layout of the feed-heating system is that the l.p. heater is installed between the extractor and feed pumps. The other three heaters are on the discharge side of the pumps and are fitted with an automatic device which by-passes the heaters in the event of a tube splitting or of water collecting in the heaters to a dangerous extent. A bled steam evaporator with a hourly capacity of 9,000 lb. of vapour provides make-up from the raw water supply.

A total cooling surface of 30,000 sq. ft. is provided by the twin surface condensers, which are designed to maintain a vacuum of 29 in. Hg. when supplied with 14,220 gal. of circulating water per min. at 55 deg. F. For this purpose two 250-h.p. vertical-shaft c.w. pumps with contactor starters have been installed on the quay side. The condensate and make-up feed are withdrawn by duplicate (full-duty) two-stage double-impellor extraction pumps. All make-up water passes through a float-operated condensate-control valve into the condenser for de-aeration before entering the closed-feed system.

Air is extracted from the condenser by duplicate (full-duty) three-stage steam jets; there is also a starting ejector for quickly establishing the vacuum required for starting the plant. To provide distilled water make-up for general station demands, a self-contained triple-effect evaporating plant has been installed with a duty of 20,000 lb. per hr. from raw water at 60 deg. F. On the instrument panel by the h.p. end of the turbine are mounted a "Dionic" condenser-leakage recorder and a dissolved oxygen recorder for the feed water as well as the usual gauges and temperature indicators.

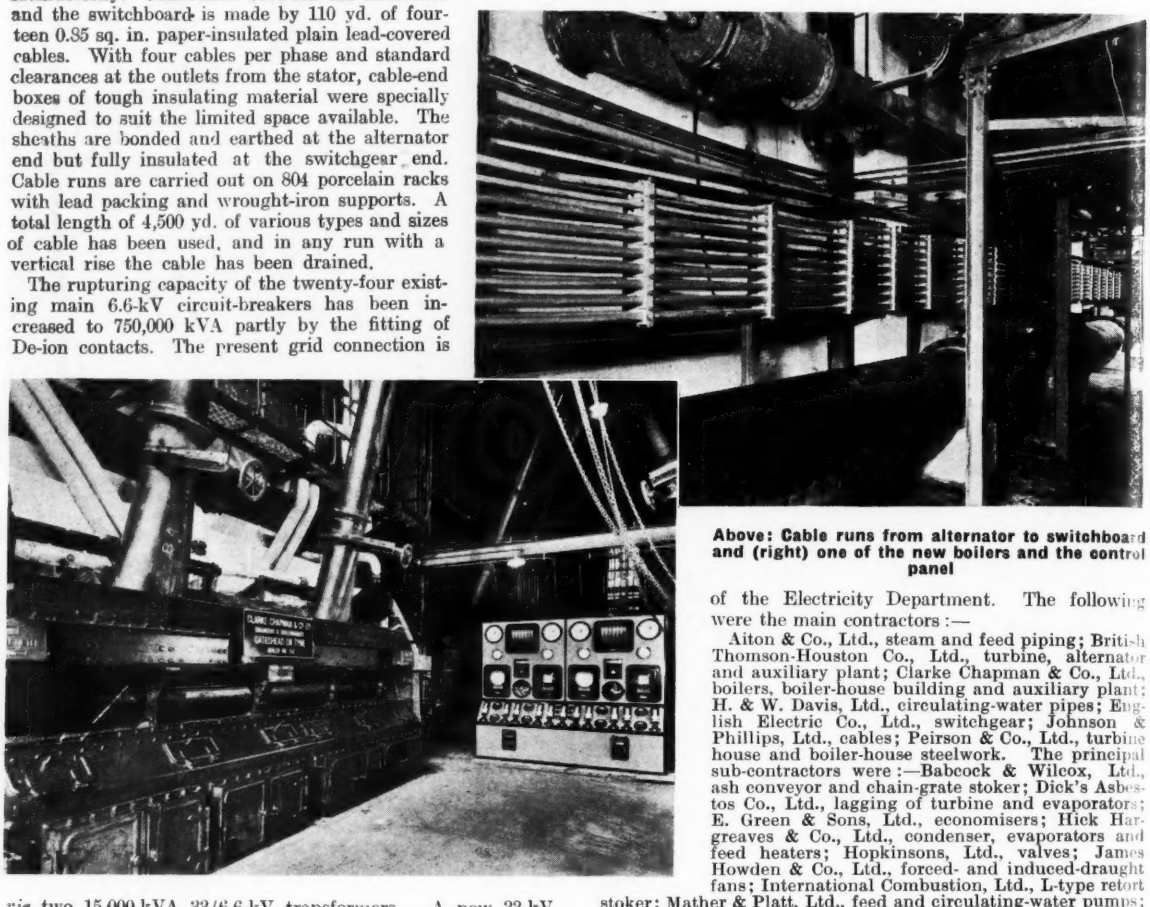
The m.c.r. of the 6.6-kV alternator is 37,500 kVA, the power factor being taken at 80 per cent. Its welded-steel stator, weighing with core and windings 55 tons, was transported complete from Rugby to Portsmouth by rail and road. The solid forging used for the rotor weighs 18 tons. Ventilation is on the closed-circuit system with air coolers mounted below the machine in the foundations. Failure of water supply to the coolers results in air being drawn automatically from the engine room.

As the extended walls of the turbine room follow the line

of the street, the crane rails were slightly curved at the junction with the old part; the fitting of a differential gear, however, has enabled the existing crane to negotiate the bend satisfactorily. Connection between the alternator and the switchboard is made by 110 yd. of fourteen 0.85 sq. in. paper-insulated plain lead-covered cables. With four cables per phase and standard clearances at the outlets from the stator, cable-end boxes of tough insulating material were specially designed to suit the limited space available. The sheaths are bonded and earthed at the alternator end but fully insulated at the switchgear end. Cable runs are carried out on 804 porcelain racks with lead packing and wrought-iron supports. A total length of 4,500 yd. of various types and sizes of cable has been used, and in any run with a vertical rise the cable has been drained.

The rupturing capacity of the twenty-four existing main 6.6-kV circuit-breakers has been increased to 750,000 kVA partly by the fitting of De-ion contacts. The present grid connection is *via* two 15,000-kVA 33/6.6-kV transformers. A new 33-kV switch-house is to be built to deal with local requirements.

The extensions were designed and completed under the supervision of Mr. B. Handley, city electrical engineer, and of Mr. P. L. Weir, his assistant, and the foundations of the plant and lighting installation were carried out by the permanent staff of the Electricity Department. The following were the main contractors :—



Above: Cable runs from alternator to switchboard and (right) one of the new boilers and the control panel

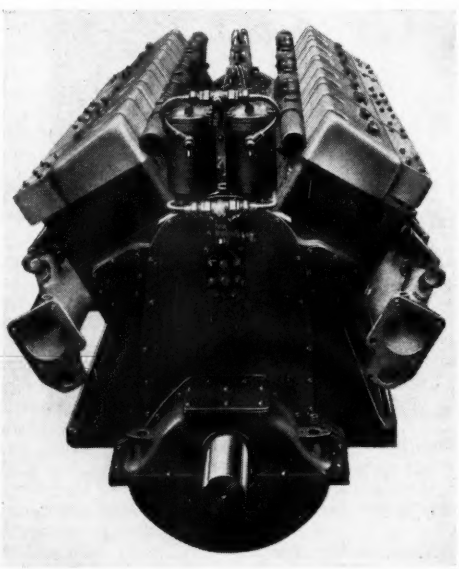
Aiton & Co., Ltd., steam and feed piping; British Thomson-Houston Co., Ltd., turbine, alternator and auxiliary plant; Clarke Chapman & Co., Ltd., boilers, boiler-house building and auxiliary plant; H. & W. Davis, Ltd., circulating-water pipes; English Electric Co., Ltd., switchgear; Johnson & Phillips, Ltd., cables; Peirson & Co., Ltd., turbine house and boiler-house steelwork. The principal sub-contractors were :—Babcock & Wilcox, Ltd., ash conveyor and chain-grate stoker; Dick's Asbestos Co., Ltd., lagging of turbine and evaporators; E. Green & Sons, Ltd., economisers; Hick Hargreaves & Co., Ltd., condenser, evaporators and feed heaters; Hopkinsons, Ltd., valves; James Howden & Co., Ltd., forced- and induced-draught fans; International Combustion, Ltd., L-type retort stoker; Mather & Platt, Ltd., feed and circulating-water pumps; Newall's Insulation Co., Ltd., lagging of the boiler steam and feed pipes; and E. & A. Sprigings, Ltd., turbine-house brickwork.

New Oil Engines

A NEW series of oil engines of from 265 to 1,000 b.h.p. now being produced by Davey, Paxman & Co. (Colchester), Ltd., are very powerful in relation to size. They are suitable for most Diesel-electric purposes and special engines are made of light alloys for high-speed marine craft, with 8, 12 and 16 cylinders inclined at an angle of 60 deg. They operate on the four-stroke cycle, are cold starting and have "Comet" combustion chambers of the Ricardo type. Superchargers can be added if required.

Special features are incorporated in the design of this "Vee RB" engine and its governor. One of a 16-cylinder pair which we saw in the test shop last week developed from 300 b.h.p. at 1,000 r.p.m. up to 1,000 b.h.p. at 1,750 r.p.m., while the other was partly dismantled to show how all parts are accessible from the top and how the cylinders can be removed through side doors without interfering with the valves or water jackets.

The big-end bearing and connecting-rod foot do not have to be passed through the cylinder bore. They can consequently be made of adequate dimensions and this also obviates the necessity of removing the cylinder heads, so enabling "Stellite" inserts and valve seats to be employed.



One of the new Davey Paxman engines

The principal advantages of Ricardo "Comet" heads are, first, the employment of single hole self-cleaning pintle type, low-pressure injectors, and, secondly, the compensating characteristics of the insulated throat which regulates the temperature of air in the chamber so that it is quite unnecessary to have any form of advance or retard mechanism throughout the speed or load range. The whole speed range is available under the control of a single lever without substantial variation in the firing pressure at any load or speed.

Lubrication is automatic, working at 50 lb. per sq. in., drawing oil from a sump. From this system is taken the secondary low-pressure supply of oil to the overhead rocker gear and similar parts. A supply of oil from the main system is also taken to provide the operating power of the double servo governor of patented construction. This is so contrived that, should the lubricating pressure fall below a predetermined pressure, the engine will be reduced automatically to idling speed. Due to the special construction of the governor, the power on the fuel pump is maintained irrespective of the engine speed.

These engines can be started by compressed air or electrically. The largest component part can be lifted by two men and the 1,000-h.p. marine type weighs 3¾ tons. A wide and deep flange is provided along each side, in which "Silentbloc" mountings are housed, to ensure sufficient stiffness for the engine to absorb all its internal reactions without support.

The Cleaning of Mercury

By J. L. Ferns, A.M.I.E.E., and
M. J. Mehler, B.Sc.

How to construct a practical distillation plant

The increasing use of mercury switches is producing a widespread demand for facilities for cleaning mercury. In this article the authors describe a practical installation which is giving good service at Wolverhampton.

THE subject of mercury cleaning is still of great interest because even meter departments which have ceased to keep stocks of tested d.c. meters still find a considerable demand for clean mercury. This demand arises from the following causes:—

(1) Time switches for large currents use mercury contact pots. Undertakings usually maintain consumers' time switches as well as their own tariff and street-lighting time switches.

(2) Many devices, including prepayment meters, use mercury switches. One make of switch in particular is liable to failure when the mercury becomes dirty after a period of use. The only cure is to clean the switch out and refill with fresh clean mercury.

(3) Even though an undertaking has ceased to supply d.c. many consumers have their own d.c. meters for works costing purposes, and they naturally send them to the local meter department when they require repairing. Furthermore, even though public supplies are a.c., there may be subsidiary meter requirements for d.c. traction or power-station auxiliaries.

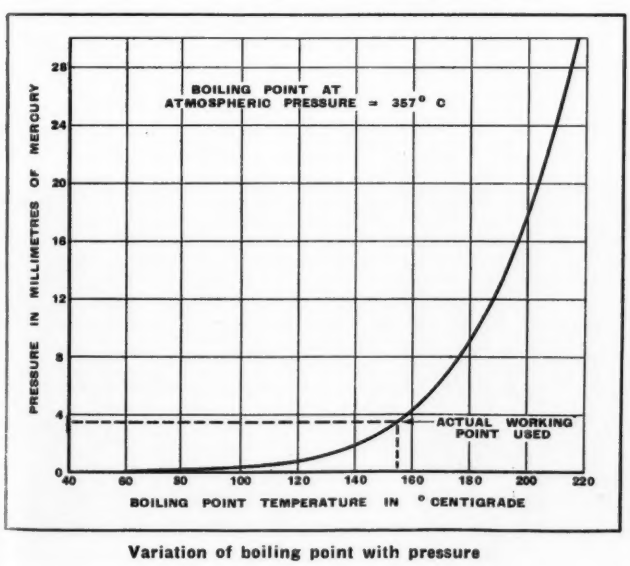
(4) An increasing number of consumers are beginning to use electric vehicles and the attendant battery meters are usually kept in order by the local meter department.

Those departments which have to deal with d.c. mercury meters are, of course, still vitally interested in methods of obtaining perfectly clean mercury. It has been established beyond doubt that the mercury-motor meter will not give a long efficient life unless the mercury is clean and free from chemicals which can set up deleterious reactions in the mercury bath. The following description of a mercury distillation plant, which was developed by Mr. T. A. G. Margary, chief engineer and manager of the Wolverhampton Corporation Electricity Department, may therefore prove of value to many meter engineers who are using other methods.

Low-pressure Distillation

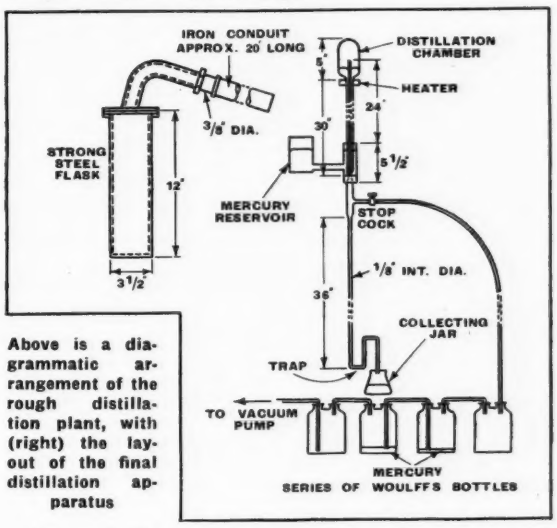
Mercury under normal atmospheric pressure has to be raised to a temperature of 357 deg. C. before it will boil, but if the pressure is reduced the boiling point is also reduced. The boiling temperature falls very rapidly when very low pressures are reached, and it is due to this basic law that it is possible to construct an ingenious but simple piece of apparatus capable of being operated by any intelligent engineer. Low-pressure distillation carries with it several secondary advantages.

The dirty mercury is gradually accumulated in suitable jars and when sufficient is collected it is first passed through filter paper to get rid of the obvious dirt and scum and then is gently boiled in an open metal pot on a bright coke fire for a few moments to burn off any remaining oil or grease. Loss of mercury due to vaporisation during the process is quite small. The mercury is next placed in a steel flask connected to a length of iron conduit which acts as the condenser. The steel flask is placed in a coke fire and the mercury distilled as slowly as possible. With the apparatus illustrated 20 lb. of mercury takes about three hours to distil.



Variation of boiling point with pressure

This rough distillation relieves the final distillation process of considerable quantities of impurities liable to clog the apparatus. While these preliminary processes cause a certain amount of oxidisation they get rid of the majority of the oil, grease and other troublesome chemicals which are present in dirty mercury. Fortunately most of the oxide formed can easily be removed by filter paper.



Above is a diagrammatic arrangement of the rough distillation plant, with (right) the layout of the final distillation apparatus

Afterwards the mercury is passed through a vacuum still, consisting briefly of a distillation bulb at the end of a glass tube which descends into a jacket leading to a mercury reservoir. From the interior of the bulb runs a thinner glass tube to a point more than three feet below the reservoir jacket. Just below the jacket a connection is made from the inner tube, *via* a stop-cock, to the evacuating apparatus, consisting of a vacuum pump acting through a series of four Woulff's bottles. The heater for the distillation bulb is a small spiral of resistance wire placed on an asbestos base about 1½ in. below the bulb. (The heater wire must not be brought too close to the glass to avoid high temperature gradients.) To conserve the heat and to protect the bulb from draughts liable to crack the glass, the bulb and heater are surrounded by a copper cylinder which is closed at the top. The Woulff's bottles are introduced to stabilise the evacuation process and to prevent oil feeding back into the still in case the vacuum is suddenly lost due to some fault.

A suitable heater circuit supply was found to be a tapped transformer giving approximately 12, 14, 16 and 18 V, and corresponding loads of 160, 220, 290 and 360 W. The steps are necessary in order to warm up the bulb gradually. The whole apparatus (apart from the Woulff's bottles and pump) is mounted on a wooden upright and is enclosed in a wooden cupboard further to prevent cold draughts blowing on to the glass tubes.

Commencing Operations

To start the apparatus working about 15 lb. of rough distilled mercury is poured into the reservoir, whilst the lower end of the long inner tube is immersed in clean mercury. The vacuum pump is then started and the stop-cock opened. Abstraction of the air from the still causes the mercury to rise (to approx. barometric height) in both the tube running from the jacket and the inner tube. During this process the level of the mercury in the reservoir is maintained by pouring in more mercury until the highest degree of vacuum attainable (3.5 mm. of mercury in the apparatus described) has been reached. The level in the reservoir is adjusted until the mercury is about 1½ in. above the neck of the bulb. An indication that the vacuum is high enough is obtained when the surface of the mercury in the Woulff's bottles is stationary.

The stop-cock is then closed and the heater switched on at the lowest heating rate. After twenty minutes or so the heat is increased to the next stage and so on until the full temperature is reached. Distillation usually commences on the third tapping, and subsequently only occasional attention is required to provide fresh mercury in the reservoir and fresh receptacles for the distillate (the object of the trap is to permit the receptacle to be changed without losing any mercury) since the vacuum maintains itself for considerable periods.

Certain precautions must, however, be taken to ensure satisfactory operation and to prevent damage to the apparatus:—

(1) During the preliminary heating the level of the mercury in the reservoir must not be disturbed or the hot glass bulb will be cracked by the cold mercury rising into it.

(2) The replenishment of the mercury in the reservoir must be done by small amounts at a time for the reason given in (1).

(3) Should the apparatus be allowed to stand idle for any length of time, such as a week-end or overnight, then the first distillate should be collected in a separate vessel. If found to have any trace of scum it must be redistilled.

(4) The vessels used should be of thick glass with ground glass stoppers or corks. Rubber bungs should not be used as they contain sulphur which readily attacks mercury.

(5) By keeping the temperature down to 155 deg. C. the rate of distillation is confined to a moderate value which prevents priming and the consequent carrying over of impurities, as well as avoiding oxidisation of the mercury which begins at 350 deg. C.

(6) If after a period of use the rate of distillation slows down, the pump is restarted and after the vacuum has been rebuilt the stop-cock is opened for a few seconds. This restores the requisite degree of vacuum in the distillation bulb. The loss of vacuum is due to the occluded air in the mercury being treated.

Impurities are, of course, left by the process in the bulb and after a period of operation the apparatus must be cleaned. Approximately 150 lb. of mercury can be treated before cleaning is needed but this figure will vary considerably with the manner in which the rough distillation is done. If the process is closed down for any length of time the impurities are liable to solidify and cause the outer tube to seize to the inner tube and thus make it almost impossible to dismantle the apparatus for cleaning. Consequently, if the process is to be stopped for more than two days it is essential to drain the apparatus of mercury (after it has cooled down) and clean the impurities away before they have time to solidify.

Since the object of the process is to clean mercury it is obvious that clean receptacles must be used in which to store the mercury. This can be ensured by filling them with a mixture of equal parts of concentrated sulphuric acid and a saturated solution of potassium bichromate in water, and allowing them to stand overnight. The receptacles are then emptied, washed thoroughly with distilled water and dried in an oven. As the acid mixture is very corrosive it must on no account be allowed to come into contact with the skin or it will cause severe burns. Its use should, therefore, be limited to qualified men.

This apparatus, which is capable of an output of ½ lb. of clean mercury per hour, has worked very successfully and tests carried out on the final distillate have not detected the presence of any impurities.

The Operation of Oil Circuit-breakers

A TYPICAL example of the use of d.c. is provided by solenoids for closing heavy circuit-breakers, and up to a point the use of rectifiers and storage batteries is competitive. For metal rectifiers it can be claimed that they are static with no chemical action or filaments, and that they incorporate nothing that requires renewal after installation. Often such apparatus has been in use for seven or eight years.

The metal rectifier is also very flexible as it can be applied to a variety of uses ranging from those in which currents of thousands of amperes are required to others calling for very high voltages, the main limitation being the thermal capacity of the rectifier and its facilities for dissipating the heat, in the one case, and the avoidance of excessively high voltage which would puncture the insulation in the second.

Local ventilation therefore plays an important part, but it is claimed that an overload of 200 per cent. for a few seconds, or 25 per cent. for a minute, will not cause any damage if the ventilation is reasonably good and the voltage applied but rarely.

The thermal rating of the solenoids used for switch closing is standardised at 30 sec. per hr., the actual time of each operation being about one second. The makers of metal rectifiers state that owing to the possibility of heavy overloading (which if not sustained is harmless) the rectifier must be disconnected from the a.c. supply when not in use. This has the advantage that by switching on the a.c. side the inductive surge in the solenoid winding is absorbed by the rectifier.

It is becoming common practice to operate solenoids at 110 V, d.c. Under these conditions the efficiency of rectifier operation is low; but this is immaterial as the power consumption in switch closing is small—a 20-kW solenoid fed through a rectifier consumes about one kWh for 100 operations.

It is not, however, claimed for metal rectifiers that they are self-sufficing for the operation of oil circuit-breakers, but only that in most installations the a.c. available can be utilised through a rectifier (supplied through a step-down transformer from the live feeder) for closing the heavy breaker, a small battery being retained for tripping the switches.

In a few cases, however, which may occur at critical periods, it is desirable to close the switches while the power supply is off. For such duties a storage battery is ideal since there is practically no limit to its rate of discharge for short periods.

A battery would not be installed solely for switch closing duty, but frequently there must be a continuous supply to coloured indicating lamps on the main switches, emergency lighting and switch tripping. What makes the battery paramount for this particular application is that its energy is available when all other sources of supply are temporarily inactive. Throughout a prolonged shut-down of main supply, the battery is feeding indicating and emergency lights, and at the end of that period—three hours is generally considered a sufficient margin—the battery will still have ample capacity available to give the momentary peak current to close the main switches. Moreover, the functioning of the battery on discharge and its recharge and maintenance in a fully charged condition, can be rendered fully automatic by the employment of a suitable trickle-charge emergency system.

As a rule, the daily ampere-hour output for switch closing is small, and compensation for switch-closing discharges means a small addition only to the trickle charge necessary to replace open-circuit losses. As an example, a switch taking 200 A for one second to close ten times daily, provides an aggregate daily discharge of about only 0.5 Ah, which is the equivalent of about 20 mA charge for twenty-four hours.—E.C.M.

A group taken at the Engineering Summer School for teachers in technical colleges which, as mentioned in our last issue, was held this year at the Trafford Park works of the Metropolitan-Vickers Electrical Co. Sir Felix Pole, chairman of the company, is in the centre of the front row

Mechanical Analogies in Electrical Work

By G. H. Rawcliffe

The employment of mechanical devices or ideas to enable the student to grasp electrical theory has behind it the authority of Lord Kelvin and Clark Maxwell. The author quotes some examples but warns against pressing parallels too far

ELECTRICAL engineering is that branch of engineering least accessible to the layman; this is because it deals so largely with abstract quantities not tangible to the five senses. Equally, most engineers understand electrical matters best by considering analogous mechanical systems. Even Lord Kelvin is stated to have said "I can never satisfy myself until I can make a mechanical model of a thing." In the lecture room it is often very helpful to describe some mechanical device similar to electrical apparatus which it is desired to explain, and this method will often succeed in imparting a partial understanding to persons to whom a rigorous mathematical treatment is, at least, unpalatable. A few examples will make this clear.

It is convenient to compare the induction motor to a hydraulic clutch and the synchronous motor to a flexible coupling. Both the clutch and the coupling are methods of transmitting a torque from a driving element (electrically, the stator) to a driven element (the rotor) but in different ways. A coupling is a fixed-speed transmitter of power, whereas a fluid clutch will permit various degrees of "slip" between the driving and the driven halves. For both a definite input to the driving element (electrically, a given current and power factor) will exert a definite output torque, since the torques between the two halves must be reciprocal. This will be true for the clutch, regardless of the resistance which the driven half presents to the fluid which is forced against it. In other words, the torque of an induction motor for a fixed input is independent of the rotor resistance, but the speed at which this torque will be exerted depends on the rotor resistance.

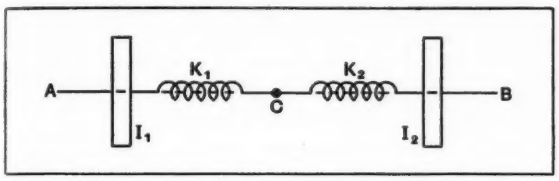


Fig. 1.—Illustrating phase swing of alternators in parallel

Quantitatively, it is clear that the fluid eddy loss in a hydraulic clutch must be equal to the torque multiplied by the difference of driving and driven speeds; that is, to the torque multiplied by the "slip" speed. But the input to a clutch is the product of torque and driving speed, hence the equations below.

Input torque = output torque ..... (1)
Eddy loss = torque × slip speed ..... (2)
Power input = torque × driving speed. ..... (3)
Eliminating torque from (2) and (3)
Eddy loss = Power input × fractional slip ..... (4)

Parallel to the Induction Motor

With one reservation, there is here a full parallel to the induction motor. The "eddy loss" is the rotor copper loss, the "driving speed" is the synchronous speed, and slip and torque have the same meanings. The "power input," however, means the machine input less the stator losses; that is, the power input to the rotor. The machine input can be regarded as a gross input, from which the stator losses must be subtracted in order to obtain the net effective input. The third equation then states that the output torque multiplied by the synchronous speed is equal to the machine input less the stator losses; or, as it is usually expressed, the torque in synchronous watts is equal to the input to the rotor in watts. Finally, the fourth equation states that the rotor copper loss is equal to the fractional slip multiplied by the power input to the rotor. Thus two of the cardinal facts about the induction motor have been deduced purely by analogy.

The idea of "load angle" for a synchronous motor may be compared to the variable angular twist in a flexible coupling, of the rubber insert type, as the load is varied. Hence it is clear that the average speeds of driving and driven elements cannot differ at all, and that the instantaneous speeds can only differ slightly during an instant, after altering the load, whilst the driving and driven halves are adjusting their relative positions. Again, the tendency of the synchronous motor to "hunt" under a variable load, and the phenomenon of phase swinging, are intelligible in the light of this analogy.

Suppose we have two discs of inertia I_1 and I_2 mounted on shafts and joined by two flexible couplings of deflection constants K_1 and K_2, and simply supported to be free to rotate about an axis AB (fig. 1). It may be shown that the periodic time of oscillation, about the axis AB, of the combination is

$$T = 2\pi \sqrt{\frac{(K_1 + K_2)\ (I_1\ I_2)}{(K_1\ K_2)\ (I_1 + I_2)}}$$

Substituting for K_1 and K_2 the electrical torque constants for two different synchronous machines, and for I_1 and I_2 the inertias of the rotors, there is obtained an expression for the period of phase swing of two alternators connected in parallel. The more normal case of a single machine on infinite bus bars follows from considering either half of the above system, with the point C held.

Finally, these machine analogies show why an induction motor is self-starting and a synchronous motor not so. It is permissible to start a machine through a hydraulic clutch, with the driving half rising sharply to full speed; that is, the stator supply may be switched on at full frequency and the rotor will pull up to speed, in an induction motor. If the drive is to be made through a flexible coupling, it will be necessary either to couple at standstill, or (theoretically) to start the first machine alone, to bring the second up to speed with an auxiliary motor, and to couple while both are rotating. This is, in effect, what is done with the synchronous motor; either it is started, as on test beds, from a variable frequency supply; or, more commonly, the "coupling" is "fitted" after running the rotor up to speed by means of an auxiliary motor or winding. The "coupling" is, of course, the magnetic flux set up by the d.c. excitation of the rotor. The synchronous-induction motor may be considered, in principle, as a convertible clutch coupling, the machine acting as the first during starting and the second when running.

The use of the grid controlled mercury arc as an invertor to change d.c. to a.c. is frequently a source of mystery, especially so is the fact that it will only invert into an existing a.c. supply, into which it will "pump" power at the frequency of this supply. The converse, that one must have an existing d.c. supply when rectifying is not, of course, true.

As an analogy to the invertor, one may consider a central vessel filled with water, with six U-tubes communicating with the vessel through taps.

The accompanying sketch (fig. 2) shows only one of the U-tubes. The water in each U-tube is caused to oscillate, the phase of the oscillations in adjacent tubes differing by one-sixth of a cycle. Each tap is opened for one-sixth of a cycle near the time when the water in the right hand of the tube is at its lowest level; that is, a pulse of d.c. enters each a.c. phase once every cycle when the grid control (the tap) is temporarily "open" to that phase. This system does not show the differing nature of input and output, but it does illustrate the behaviour of an invertor whose electrical action is to feed d.c. against a back e.m.f. set up by each a.c. phase in succession, the time of such feeding being controlled by the grid bias It is usual to invert on to the six-phase secondary of a transformer and thence on to three-phase mains, but, in principle, the inversion might be made direct, with only three phases in the invertor.

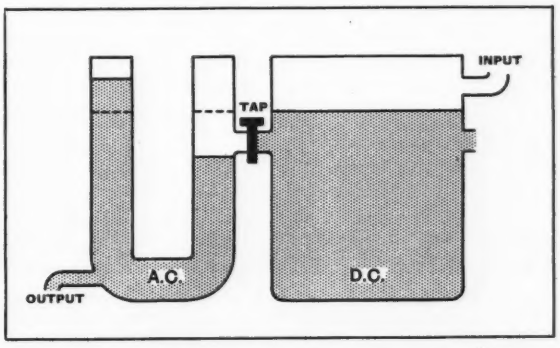


Fig. 2.—Analogy of the operation of a mercury rectifier as invertor

Maxwell, who predicted the theory of electromagnetic waves from a mechanical view of "the ether," himself wrote as fol-

lows: "For the sake of persons of different types of mind, scientific truth should be presented in different forms, and it should be regarded as equally scientific whether it appears in the robust form and colouring of a physical illustration, or in the tenuity and paleness of a symbolical expression." There can be little doubt that "robust form and colouring" make a powerful appeal to most engineers. The examples above are types of such "form," and could be supplemented almost indefinitely.

A too-rigidly mechanical conception of electrical quantities may, however, lead to serious trouble; witness the recent controversy over the rotation, or non-rotation, of the "lines of force" surrounding a cylindrical bar magnet, when the magnet is rotated about its axis. A magnetic field of unchanging magnitude and direction at every point must be represented by fixed lines of force, since a line of force is an arbitrary convention to define a magnetic field. Hence it is clear that in no true sense can the lines of force in this case be said to rotate, whereas a too mechanical conception would visualise them revolving, "skipping rope-wise," about the axis of the cylinder.

Thus proof by analogy may be very dangerous, for the parallel may easily be incomplete, and therefore such proof is better regarded as a demonstration of reasonable probability rather than of certainty. When some property has been proved, however, by rigorous methods, an analogy will often serve to keep vividly before those who know it the method of proof. Equally, it will often serve as a commonsense mnemonic for those who may have many an occasion to use some engineering property without needing to prove it.

Correspondence

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Domestic Refrigeration

Mr. W. H. Rayner's contention in his article that a refrigerator is useful at all times of the year does not justify the extension of a sales campaign beyond the summer months. Artificial lighting is used throughout the year, and electric heating is a boon in spring and autumn but each has its season for intensive sales propaganda.

To the average householder, a refrigerator is intended to reduce temperature for food storage and unless there is a temperature which obviously needs reducing, no amount of advertising and sales stunts will create a demand. Even among the well-paid officials of supply undertakings and other interested concerns there are comparatively few who possess refrigerators. It is also rather a pity that E.D.A. in its Refrigeration Campaign should have emulated some of those national advertisers whose exaggeration is a by-word. By such methods the industry gains nothing and E.D.A. loses dignity.

While every effort should be made to keep the advantages of the electric refrigerator before the public it is as well to maintain a sense of proportion in this matter, for there are easier and quicker ways of selling a few extra shillingsworth of electricity per annum to a far greater number of households than will be induced to purchase refrigerators before the millennium.

July 16th. CRITIFRIG.

In my opinion there are several factors which militate against an increased demand for refrigerators. First, as Mr. Rayner states, very few builders give the necessary amount of space for installing what is generally accepted as a very bulky article in a modern house. The larder in most small villas is a hole-and-corner affair and if a refrigerator were installed there would be little room for anything else. Again, in installing a unit in a modern house which has been built some time, it is found that the larder is on an outside wall far removed from the run of electrical circuits and this means additional surface wiring as the cheapest method of installation. The houseproud housewife usually dislikes this and demurs when it is suggested that a refrigerator be installed.

The cost of installation usually adds to the already high price to be paid for the refrigerator, and this, I think, is the crux of the whole matter. The medium-priced refrigerator is usually too small to hold enough food for the average family and if it cannot hold all the perishable foods then they might as well be without it.

Therefore, unless manufacturers are able and willing to reduce their prices I am afraid that all the sales campaigns, &c., will be in vain as most people still look on the refrigerator as a luxury, not a necessity.

D. MACLAREN CATHCART, B.Sc., A.M.I.E.E.

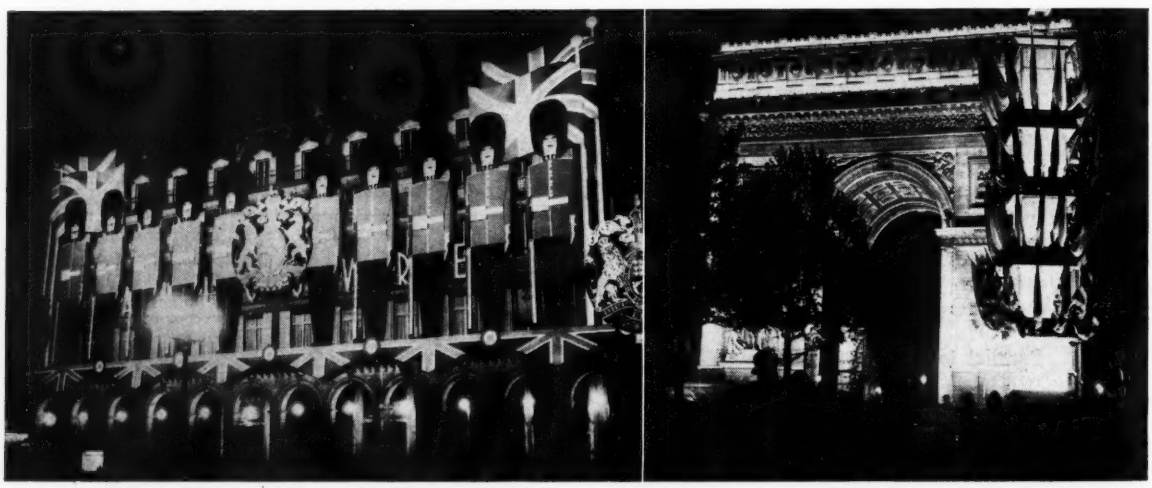
Northwich, *July 16th.*

Hire and Hire Purchase

As a contractor pioneer in assisted wiring schemes and having passed through the initial stages years ago, I should say that the march of progress is more seriously impeded and hampered by a disinclination on the part of some supply authorities to accept business in certain circumstances, rather than by any hesitation on the part of the contractor to do business.

Of the many difficulties and obstacles only a few barriers remain, namely: (a) Distressed areas; (b) slum clearance schemes; and (c) exorbitant service charges. The effect of (c) can be observed by comparing with others the percentage of houses wired when the item is included in the tariff, and those authorities who have withdrawn the charge can speak of the great influx of business following the withdrawal.

Manchester, *July 18th.* L. E. WILSON.



Very lavish lighting greeted the King and Queen on their visit to Paris this week. Our illustrations show a row of gigantic guardsmen and other devices on the Hotel Crillon (Place de la Concorde) and the illuminated Arc de Triomphe

Rural Electrification in Victoria

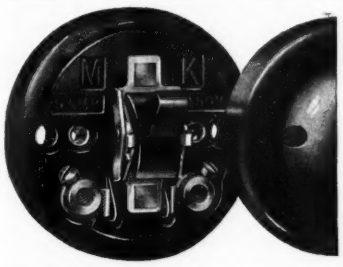
We have received from the State Electricity Commission of Victoria a copy of the first issue of "Victorian Rural Electrification News," which will be published quarterly and issued to consumers and prospective consumers in the State. This contains interesting illustrated articles on the many uses of electricity on the farm and in rural industries.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

"Slot" Switches

A new design of switch known as the "Slot" switch has recently been introduced by M.K. ELECTRIC, LTD., Wakefield Street, Edmonton, London, N.18.



The M.K. "Slot" switch

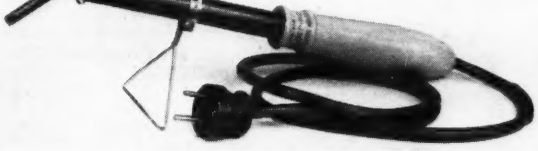
The 5-A switch, completely redesigned, has a flexible compression switch and patent dual tripping links. It is shallower and the general appearance has been completely modernised, but the standard 2-in. diameter base has been retained so as to suit standard mounting blocks.

For the semi-sunk switch a new square bakelite mounting block is available, making an attractive combination which costs little more than the ordinary surface switch. There are new sunk units in extra shallow boxes, approximately ½-in. deep, which can generally be used for housing estates without cutting away the brickwork. In order that the switch and switchplate may be in perfect alignment regardless of irregularities in the plaster level, a special adjusting screw is provided.

The switchplates have highly polished broad bevels and finely matted centres, and the boxes are available in bakelite, hardwood and cast iron. The bakelite boxes have knock-outs whereas the cast-iron type have threaded holes for round conduit or grip entries for oval conduit.

A Universal-voltage Soldering Iron

A soldering iron suitable for operation on supplies of 100/130 W and 200/250 V has now been made available in this country by A. HAWKINS, 15, Wexford Road, Nightingale Lane, London, S.W.12. It should prove of considerable help to electricians



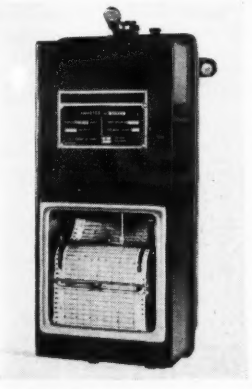
The universal-voltage soldering iron

and radio repairers who may frequently have to carry out repairs away from the shop and operate the iron on a non-standard voltage.

The iron is arranged so that one pin of the plug is detachable and can be screwed into either of two sockets. Three-core flex is employed. A special element, tapped for 100/130 V, is wound on a steatite former and is hermetically sealed, being easily replaceable as a unit. The leads plug into the element housing and can be rapidly detached. The standard bit is slightly angular in shape and the loading is about 100 W. A special metal rest is fitted so that the iron may be placed on a bench without danger of scorching. The price is little more than that of a standard soldering iron.

Leakage Recording Ammeter

New equipment by ELLIOTT BROTHERS (LONDON), LTD., Century Works, Lewisham, London, S.E.13, is a d.c. surge-proof leakage recording ammeter of the moving coil type. It has been designed to comply with the revised Electricity Supply Regulations, 1934, No. 4 (D), "Earthing of Low Voltage Networks," and is scaled 25-0-25 A with a shunt capable

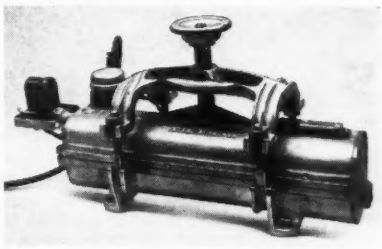


The new Elliott d.c. surge-proof leakage recording ammeter

of carrying 250 A continuously. A high-speed relay, the operating coil of which is connected in series with the main circuit, is also supplied. When a short occurs, the relay operates, thereby inserting resistance in the moving-coil circuit of the recorder and increasing its range to 250 A. When the fault is cleared, the relay automatically restores itself and the recorder. The relay acts with great rapidity and, under repeated tests with a 250-A surge current, the manufacturers state, the recorder pointer did not move more than half an inch beyond its pre-fault reading. The current actually required to operate the relay is 30 to 35 A.

Electric Vulcaniser

BRITISH INSULATED CABLES, LTD., Prescot, Lancs, have recently altered and improved the design of their trailing-cable vulcaniser. The main castings have been strengthened, and in place of the wing nuts which were



The B.I. electric cable vulcaniser

formerly fitted to the side clamping screws, fixed collars are now provided so that the clamping frame is kept square with the mould and cannot be wrongly adjusted. The position of the bushings for the flexible leads which join the two halves has been altered and the rating of the heating elements has been increased to 1,200 W to reduce the time needed to attain working temperature. A guard has also been provided to protect the thermostat from damage. A range of split liners is available. With this range repairs can be carried out on cables from ¾ in. to 2 in. diameter. The vulcaniser can be supplied for 100-150 or 200-250 V a.c. or d.c.

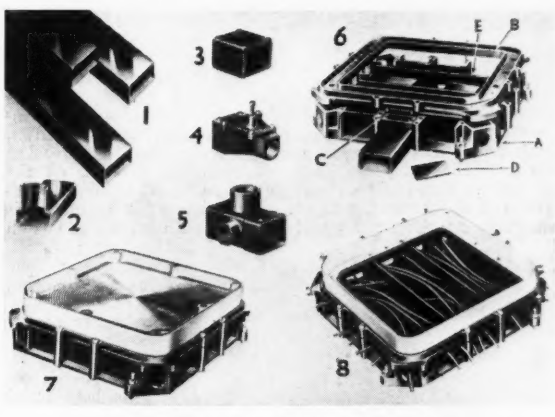
Under-floor Duct System

A new development by the SIMPLEX ELECTRIC CO., LTD., Broadwell Road, Oldbury, Birmingham, is an under-floor duct installation system.

The basis is a rectangular duct giving maximum cable capacity with minimum depth. The components are similar to the conventional circular conduit fittings but embody certain additional features to render them accessible after having been embedded in the floor in a permanent fashion.

The wiring ducts are installed in the floor "fill"—the part commonly employed for the various types of piping used in the construction of a large building. A typical installation would consist of a junction box, from each of the four sides of which two or three rectangular steel ducts would lead to further junction boxes, forming as a whole a grid arrangement of ducting, the cross-over points being junction boxes. The boxes have specially shaped interior separators which ensure that cables running in certain specified ducts are kept mechanically separate.

When a box has been placed in position and carefully levelled a metal tray is dropped into place so that its sides coincide with the final floor level. The tray is then filled



The "Simplex" under-floor duct system

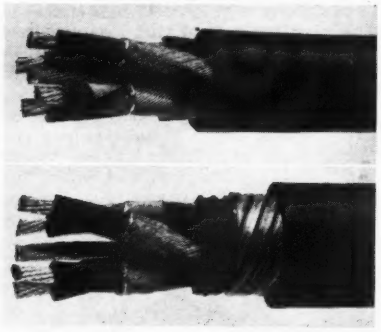
1.—Steel ducts. 2.—Section of duct showing permanent outlet. Outlets may be cut on site with the special tools provided. 3.—Plain coupling for joining duct to duct. 4.—Duct to screwed conduit adaptor. 5.—Coupling with tee outlet for screwed conduit. 6.—Junction box consisting of "A," the main body on to which a ring-like cover "B" is fixed. Each side is made to take three ducts. A smaller size duct is seen entering with an adaptor piece "C" in position, the unwanted duct entries being closed by blanking-pieces "D." The specially shaped interior separator "E" ensures mechanical separation. 7.—Junction box fitted with tray for screw adjustment to floor level. 8.—Junction box showing separation of independent supply cables.

with the floor material (linoleum or concrete, &c.) and remains removable in one piece to give easy access to the box.

The various components of the system are shown in the accompanying illustration, the steel ducts being supplied in two sizes—2⅛ in. by 1⅛ in. and 2⅛ in. by 1½in.

New Trailing Cables

BRITISH INSULATED CABLES, LTD., Prescot, Lancs, have recently introduced two new types of trailing cable, both of which are suitable for use with earth-leakage and current-overload protection and provide for remote-control switching.



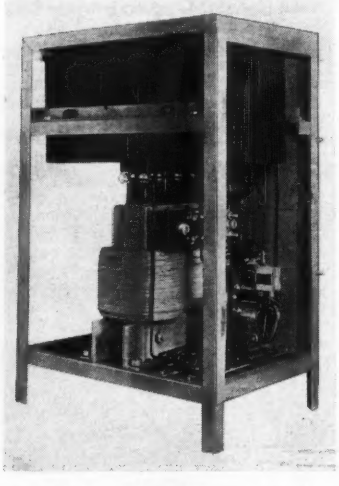
New B.I. trailing cables. Type A above; Type K below

Type A is a five-core cable with three power cores individually screened with tinned-copper wires, and a pilot core of the same cross-sectional area as the power cores and built up to the same diameter. These four cores are laid around a central bare earth conductor, with which the screens are in contact throughout. The cable is then tough-rubber sheathed overall.

The second, Type K, is also a five-core cable and is similar in construction to the first mentioned, but in addition has, over an inner tough-rubber sheath, an armouring of narrow flat metal strip laid on with a short lay between two layers of canvas and is then tough-rubber sheathed overall. The flat metal strip armouring is the latest development for giving increased protection against crushing by falls of roof. The construction also minimises the risk of open sparking.

Vehicle Battery Chargers

Battery chargers for use with electric vehicles are being made by F. C. HEAYBERD & Co., 10, Finsbury Street, London, E.C.2. They are designed to give fully automatic operation. These chargers incorporate metal rectification and are built in cases of angle steel construction, fitted with ventilating screens and a door giving access to terminals and initial voltage adjustment. There is a model available for every type of vehicle.



A Heayberd vehicle battery charger

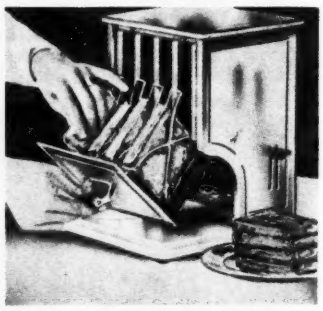
The transformer is of the double-wound, air-cooled type fitted with taps for input voltage adjustment and made to B.S.S. 171, and the bridge-connected metal rectifiers give full-wave rectification. A contactor of sturdy design and silent operation incorporated in each unit comes into operation soon after the battery reaches its fully charged state and automatically switches off the chargers. This enables the apparatus to be left without supervision throughout the night. A 2½-in. scale ammeter is mounted on the front panel together with an input switch and a snap action selector giving four different charging rates.

The charger is supplied with 15 ft. of tough rubber cable, which when not in use is coiled round the special hooks mounted on the door. There are two rewirable input fuses and one heavy rewirable output fuse. Charges rated at 5, 10 and 15A for six or twelve cells can be obtained.

A Commercial Oven Toaster

A new "Universal" commercial oven toaster has been introduced by L. G. HAWKINS & Co., LTD., 30-35, Drury Lane, London, W.C.2.

Two or four slices can be toasted evenly at the same time, the operation being controlled by a time switch which can be set at from half to three minutes. The door opens automatically at the end of the predetermined time, although the toaster can also be operated manually.



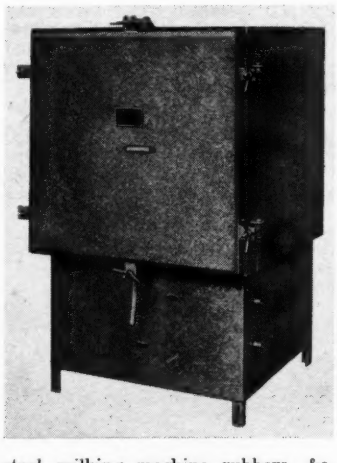
The new "Universal" commercial oven toaster

The base is of white porcelain and the metal parts are chromium plated. The maximum loading with five elements is 1½ kW, and a dual switch enables three elements only (945 W) to be used when two slices are being toasted. A convenient release permits the examination of the toast at any time independently of the automatic door opening, and a pilot light indicates whether the supply is "on" or "off." The measurements are 11½ in. wide by 11 in. deep, by 12½ in. high, the weight being 19 lb.

Dairy Sterilising Chest

A new electric dairy sterilising chest with water heating and pressure steam jet has just been placed on the market by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.

The model at present available has a capacity of 27 cu. ft., internal dimensions being 3 ft. by 3 ft. by 3 ft., while the loading is 6 kW. Other sizes will be ready shortly.



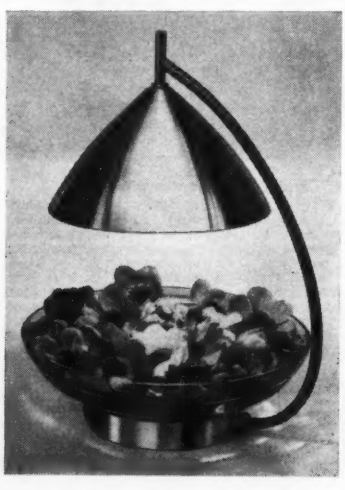
The G.E.C. steriliser

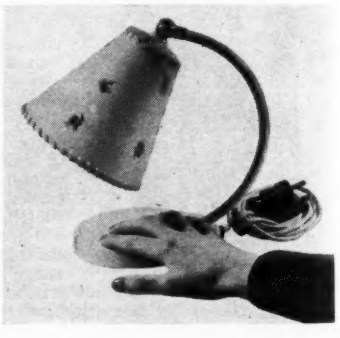
Instantaneous and positive steam cut-off results in immediate drying of utensils, so preventing rust and consequent shortening of life. In addition, a pressure steam jet is fitted for churn stool, milking machine rubbers, &c. Hot water is always available when steaming is not in progress. Maximum efficiency and minimum water consumption are obtained by the return of condensate to the heating compartment, and this also minimises the formation of scale in hard water districts. The elements are protected against burn-out by automatic water feed, which also reduces the amount of water heated to the minimum. All parts that may require inspection or adjustment are accessible from the front, while another useful feature is that door hinging can be reversed at any time.

Exceedingly robust, the chest is of all-metal construction, every part being galvanised after manufacture. It is supplied complete with metal draining rack and thermometer.

Improved Reflectors

By reducing the depth of the ribbing of its reflectors, ECA-RAY SALES, LTD., 12a, Bourchier Street, Wardour Street, W.1, are enabled to take full advantage of the high efficiency of a new silvering process which they have recently developed. Compared with the company's older models of similar design, the new reflectors show about 15 per cent. improvement in lighting intensity and are claimed to be nearly twice as efficient as the average foreign product. Several different models are available, including straight and angle types. Long life is ensured by an improved method of backing, which includes copper sealing and a final coating of heat-resisting aluminium varnish.





Two unusual table fittings recently introduced: a combined fruit bowl and lamp sold by L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, London, W.C.2, and the "Tala Touchlite" of Taylor, Law & Co., Ltd., Tala Works, Birmingham, 7, which is operated merely by pressing the base

British Overseas Electrical Trade

Electrical exports in the first half of this year were worth £10,700,000 — £2,000,000 more than in the first six months of 1937

IN June the value of Britain's electrical exports remained well in advance of the total for the corresponding month of last year, itself very satisfactory. The actual improvement was £188,250 (12 per cent.) to a total of £1,703,559. It is noticeable, however, that the individual increases were practically confined to machinery and equipment for telegraphy and telephony, much of which would represent orders placed a good many months ago. In the smaller apparatus lower values were general, partly due, no doubt, to the extra working day in June last year. Exports as a whole, it is to be noted, fell in value by 17 per cent.

TABLE I.—EXPORTS AND IMPORTS DURING JUNE

	Exports.		Imports.	
	June, 1938.	Inc. or dec. compared with June, 1937.	June, 1938.	Inc. or dec. compared with June, 1937.
Submarine telegraph and telephone cables	£7,275	− £5,696	*	—
Telegraph and telephone wires and cables (not submarine)	88,315	+ 25,896	*	—
Other insulated wires and cables	220,716	− 81,711	£40,094	− £10,490
Radio receivers, not radiograms (excluding valves)	28,562	+ 8,215	8,050	+ 632
Radio transmitters (excluding valves)	17,375	− 9,621	*	—
Radio valves	28,094	− 11,181	7,122	− 6,439
Other radio parts and accessories	42,113	− 9,912	48,226	− 40,689
Telegraph and telephone apparatus (other than radio)	284,556	+ 117,413	*	—
Electric carbons	*	—	4,537	− 7,654
Incandescent lamps	47,126	− 5,047	12,170	− 1,838
Other lighting apparatus	44,749	− 1,448	29,690	− 20,649
Primary batteries	12,915	− 674	*	—
Accumulators	37,292	− 5,502	*	—
Electric cooking and heating apparatus	22,398	− 2,680	*	—
House service meters	8,617	− 7,247	*	—
Other electrical instruments	24,301	+ 4,400	26,316	+ 712
Insulating materials not elsewhere specified	17,681	+ 1,283	*	—
Unenumerated electrical goods and apparatus	96,823	− 14,944	55,376	− 23,483
Electric generators up to 200 kW	36,002	+ 3,447	*	—
Electric generators over 200 kW	88,995	+ 22,700	*	—
Electric motors	148,373	+ 11,866	29,253†	+ 4,005
Convertors and transformers	117,359	+ 55,002	*	—
Starting and controlling gear for motors	54,492	+ 19,436	*	—
Switchgear	186,865	+ 75,847	*	—
Other electrical machinery	18,595	+ 1,763	13,198	− 7,362
Electric vacuum cleaners	21,970	− 3,355	19,442	− 3,422
Total	£1,703,559	+ £188,250	£293,474	− £116,677

* Not classified separately. † Not railway and tramway motors.

In the electrical machinery section the total value of shipments last month—£674,651—was £186,706 (39 per cent.) higher than in the corresponding month of 1937 and also £42,906 more than in May. Shipments of switchgear reached the record value for the year of £186,865, an advance on June, 1937, of £75,847, and converting and transforming plant exports (£117,359) were £55,002 up on last year.

Heavy shipments of telegraph and telephone apparatus to Australia, unclassified British countries and Argentina resulted in a very high total value for this type of equipment. The following analysis gives the principal destinations, with comparative values (June, 1937, in parentheses):—

Australia, £106,921 (£42,348); South Africa, £25,865 (£23,208); other British countries, £80,130 (£44,605); Argentina, £19,792 (£6,198); and other foreign countries, £51,848 (£50,784).

Exports of wires and cables of the telegraph and telephone type (not submarine) also show an improvement, but the decline in the value of other insulated wires and cables continued. The chief destinations of exports of this class in June were as follows:—

Rubber insulated wires and cables.—Australia, £27,063 (£40,285); South Africa, £17,978 (£37,322); British India, £14,295 (£17,781); New Zealand, £8,272 (£4,328); other British countries, £19,835 (£25,772); and foreign, £14,943 (£24,145).

Electric wires and cables, insulation other than rubber.—South Africa, £38,565 (£36,421); Australia, £28,111 (£48,306); British India, £15,914 (£22,178); other British countries, £22,784 (£20,553); and foreign countries, £12,956 (£25,336).

Radio sets, other than radio-gramophones, sent to overseas markets numbered 4,478 against 4,548 in June, 1937, but their value was greater (£28,562 as compared with £20,347). In the case of valves the position was reversed, the number increasing from 99,274 to 116,556 and the value falling from £39,275 to £28,094. Lamp exports numbered 1,520,000 against 1,640,000, with values of £47,126 and £52,173, respectively. The number of meters sent abroad fell off rather sharply to 8,516, after the recent improvement which culminated in May's high total of 19,427.

This year electrical exports have now reached the value of £10,705,509, an increase of £2,003,241 over the first six months of 1937. Of this improvement, machinery has accounted for more than half. Particularly pleasing is the development in this direction in some of the smaller, unclassified markets, to which exports of transformers, switchgear and allied equipment have risen in value from £293,685 to £621,745.

There was a further fall in electrical imports last month, when the total value was £293,474, compared with £301,485 in May and £410,151 in June, 1937. The decrease compared with the corresponding month of last year was £116,677, or 28 per cent., and most types of equipment were again affected. The one exception of note was motor imports (not railway or tramway) which increased from 135 to 239 tons. Radio receivers, excluding radio-gramophones, brought into the country numbered 3,585 against 3,228 in June, 1937, with an increase of £632 in value. Valves imported numbered 77,389 against 118,608. In the case of electric lamps, the arrival of considerable quantities of the cheaper types is indicated by the fact that the number imported rose from 3,811,000 to 7,574,000, while the value fell from £14,008 to £12,170.

The main sources from which electrical goods and apparatus were obtained last month, with comparative values, were as follows: Germany, £74,691 (£91,596); United States, £55,648 (£80,226); Netherlands, £32,829 (£72,770); Belgium, £12,963 (£28,899); Switzerland, £12,709 (£18,864); France, £7,324 (£7,926); Austria, £2,625 (£3,969); other foreign countries, £24,807 (£25,312); and British countries, £7,985 (£11,917).

In the first half of the year imports have amounted to £1,851,338, a decrease of £528,312 from the value in the first six months of 1937, equivalent to 22 per cent.

TABLE II.—BRITISH ELECTRICAL EXPORTS DURING JUNE

Destination.	Goods and apparatus, June, 1938.	Inc. or dec. compared with June, 1937.	Electric generators, June, 1938.	Inc. or dec. compared with June, 1937.	Electric motors, June, 1938.	Inc. or dec. compared with June, 1937.	Other electrical machinery, June, 1938.	Inc. or dec. compared with June, 1937.
Eire	£27,172	− £8,570	*	—	*	—	*	—
Channel Islands	10,314	− 6,026	*	—	*	—	*	—
Palestine	3,745	− 3,307	*	—	*	—	*	—
British West Africa	14,152	+ 2,865	*	—	*	—	*	—
Union of South Africa	154,505	− 5,877	£24,825	+ £18,792	£27,403	− £3,421	£125,785	+ £71,189
British India	98,601	− 2,408	45,610	+ 39,827	17,723	+ 2,935	52,945	+ 14,004
British Malaya	30,348	+ 3,102	*	—	*	—	11,631	+ 3,421
Ceylon	22,223	+ 8,241	*	—	*	—	*	—
Hong Kong	11,154	+ 3,261	*	—	*	—	*	—
Australia	212,463	+ 21,203	11,803	+ 4,433	20,865	+ 5,621	22,708	+ 3,735
New Zealand	95,815	+ 19,767	*	—	5,795	+ 894	15,400	+ 1,747
Canada	5,382	− 10,562	1,604	− 52,997	3,938	− 1,650	11,123	+ 6,574
Other British Countries	50,102	− 2,758	14,919	+ 5,894	15,742	− 4,868	43,067	+ 20,623
Sweden	6,742	− 3,104	*	—	*	—	*	—
Denmark	9,866	− 11,034	*	—	*	—	*	—
Netherlands	16,024	+ 3,397	*	—	*	—	5,776	− 3,857
Belgium	9,582	− 300	*	—	*	—	*	—
France	9,631	− 13,064	*	—	*	—	2,046	− 1,830
Portugal	5,375	− 10,205	*	—	*	—	*	—
Spain	1,953	+ 431	*	—	*	—	*	—
Italy	3,992	− 2,926	*	—	*	—	*	—
Greece	4,083	− 1,812	*	—	*	—	*	—
Rumania	30,584	+ 27,282	*	—	*	—	*	—
Egypt	7,605	+ 3,450	*	—	*	—	90	− 1,402
China	2,114	− 25,929	*	—	*	—	327	− 3,511
Brazil	8,879	− 7,675	*	—	*	—	*	—
Argentina	41,800	+ 1,236	*	—	*	—	1,484	− 1,059
Other Foreign Countries	134,702	+ 22,866	26,236	+ 10,198	56,907	+ 12,355	86,929	+ 42,414
Total	£1,028,908	+ £1,544	£124,997	+ £26,147	£148,373	+ £11,866	£379,311	+ £152,048

* Not classified separately. Vacuum cleaners are included in Table I but not in Table II.

In the Courts

Settlement of Libel Action

In the King's Bench Division on July 15th the case of Lawrence *v.* St. Helens Cable & Rubber Co., Ltd., was mentioned to Mr. Justice Hawke.

It was stated by Counsel for the plaintiff, Mr. J. M. Lawrence, that this was a libel action brought by him in the following circumstances: The plaintiff was a director of Horlicks, Ltd., and was interested in Pyrotenax, Ltd. Plaintiff introduced the use of Pyrotenax cables to Horlicks, Ltd., who used it in the erection of a new factory at Slough in 1937. In February, 1938, the defendants in a memorandum which it sent to its representatives, made references to the use of the Pyrotenax cables by Horlicks in the new factory and phrased these references in such a way as to have been understood by some of those who read the memorandum to reflect discreditably on the plaintiff.

The defendants now, by their Counsel, said that they had no intention of discrediting the plaintiff and regretted that any such construction should have been put on the memorandum. They had withdrawn the memorandum and it would not be reissued. They now wished to express publicly their regrets to the plaintiff for any distress they had caused him by their action.

Counsel for the plaintiff stated that he had no desire to make any money out of the matter and the defendants having agreed to indemnify him in respect of the costs which he had incurred he now asked leave to have the record of the case withdrawn on the terms mentioned.

His Lordship assented.

Action Against Contractors Settled

At Manchester Assizes, last week, Mr. Frank Stemp, Oldham, sued Messrs. Starkie & Sparks, Ltd., electrical contractors, of Oldham, and Mr. Edward Starkie, a director of the firm, claiming damages for malicious prosecution. He also sought to recover damages for alleged wrongful dismissal and libel from the company and another director, Mr. Fred Sparks.

It was stated that Mr. Stemp was employed by the company as the manager of the Todmorden branch. In 1933 he was sent to Leicester, and while there he had a disagreement with Mr. Sparks. Mr. Starkie sent him to Todmorden, where he opened a branch. Towards the end of 1936 the Todmorden branch was not doing so well as previously. Then on December 15th, 1936, plaintiff found a note waiting for him at home simply dismissing him. On April 29th, 1937, he received a letter from Electrical Facilities, Ltd., accusing him of taking £1 out of a meter and threatening prosecution. A letter had been written to Electrical Facilities by Mr. Sparks, in which he said: "Mr. Stemp is not now in our employ. He was dismissed instantly for particular reasons which we consider very serious, and about which we are prepared to prosecute. . . I do think it advisable that we should receive your instructions to proceed in the prosecution." It was alleged that letter was written with malice. There was no prosecution, but summonses were issued against Mr. Stemp for taking lead-covered cable while in the firm's employ. The case was dismissed.

The parties to the action conferred and a settlement was reached. Defendants said there was no suggestion against the honesty of Mr. Stemp. Judgment was entered for £150 and £100 costs in settlement of both actions and any outstanding claims.

Infringement of Business Names Act

Harold Gleave, Birkenhead, was summoned at Birkenhead Police Court on July 15th for an infringement of the Business Names Registration Act. Mr. Roger Lewis, who prosecuted, said that last March the Registrar received an application for registration purporting to come from a firm known as Ashton and Andrews, electrical contractors, 56, Oxton Road, Birkenhead. This firm belonged to defendant, and the form should have shown his full name, but it bore the signature of Arthur Andrews, 27, Salisbury Street, Birkenhead.

It was alleged that Gleave started in 1933-34 in business as the Birkenhead Electric Company, at 56, Oxton Road. That firm was never registered. After losing money, he gave up the shop and carried on business at his private address, endeavouring to pay off the money, amounting to £500, which he owed to creditors. He cleared off most of his debts, then he moved to his present address for the sale of electrical goods, repairs and installations. He had recently left the shop without giving notice, and still owed rent. Mr. Lewis said that defendant wanted to register the business in the name of Ashton and Andrews to deceive his creditors and the members of the public who intended to deal with him, so that he could give credit and not disclose his own name. Andrews was the name of an errand boy who subsequently became an apprentice.

Defendant was fined £10 and £1 19s. 8d. witnesses' fees on the charge of making a false statement, and £5 on the charge of defaulting in making his registration return.

Parliamentary News (BY OUR SPECIAL REPORTER)

London Railway Extensions

In the House of Commons on July 13th, Mr. Bull asked the Minister of Transport what was the estimated cost of the works proposed to be carried out by the London Passenger Transport Board on the extensions of its railways to the Alexandra Palace, High Barnet and Bushey Heath, and the value of the contracts already let; and what was the estimated cost of the works proposed to be carried out by the London and North Eastern Railway on the same line and the value of the contracts already let.

Mr. Burgin said that the estimated cost of extensions of tube railways to form junctions with the railways of the L.N.E.R. Co., of electrifying that company's lines to High Barnet, Edgware and Alexandra Palace, and of doubling the branch line to Edgware was £5,553,000, and the estimated cost of extending the London Transport Board's railway from Edgware to Aldenham was £1,230,000. The Board was to carry out work to the value of £6,033,000 and the balance of £750,000 was to be carried out by the company. The value of contracts placed for these works was approximately £3,000,000 by the Board and £100,000 by the company.

Trolley Vehicles for Gateshead

A House of Commons Select Committee considered on July 13th a Bill promoted by the Gateshead and District Tramways Co. to secure power to abandon tramways in Gateshead and neighbouring areas and to substitute either trolley vehicles or omnibuses. Mr. Sidgwick, Parliamentary agent, said that the company asked for ten years within which the conversion might be made. The elasticity in the provisions of the Bill was introduced for the reason that as there was through running of vehicles between Gateshead and Newcastle it was essential that on through routes the vehicles should be of the same type and Newcastle had not yet decided whether to run trolley vehicles on cross-river routes. The Bill was ordered to be reported for third reading.

Trolley Vehicle Extensions

Three Bills promoted to confirm provisional orders for the extension of trolley vehicle services were considered on July 14th by the House of Lords Committee on Unopposed Bills. Newcastle-on-Tyne which now has 16 miles of trolley vehicle routes desires to institute fifteen new routes (eight of which are now served by tramcars) with a mileage of 12½; West Hartlepool which now has 9 miles of routes proposes to increase that by 9 miles on fifteen new routes; and Ipswich, with 21 miles in operation, proposes short extensions of 1½ miles. All the Bills which had already passed through the lower House were ordered to be reported for third reading in the House of Lords.

West Midlands Electricity

The House of Lords Committee on Unopposed Bills gave approval on July 14th to a Bill empowering the Electricity Commissioners to sanction the borrowing of £5,000,000 by the West Midlands Joint Electricity Authority which already has loans of £4,800,000. Additional money is required for the development of the undertaking. The Bill which has already passed the House of Commons was ordered to be reported for third reading.

Responsibility for Electricity Supply

On July 14th Mr. Wakefield asked the Prime Minister whether, in view of the fact that the functions of the Minister of Transport, in his capacity as the highway authority for the trunk roads, in some cases conflicted with his responsibility for the electricity supply industry, he would consider the desirability of the responsibility for electricity supply being transferred to another department of State where such a conflict would not arise.

Sir John Simon, who replied, said that the Prime Minister was not aware that any practical difficulties had arisen as a result of the dual responsibility of the Minister of Transport.

Cable Jointing Handbook

New sections which have been added to the third edition of "Practical Cable Jointing," recently published by W. T. Henley's Telegraph Works Co., Ltd., price 5s., contain instructions on jointing dwarf type overground disconnecting boxes and screened type cables. Testing for moisture in paper-insulated cables is another new item, and the pages on safety-first precautions against electric shock and fire are particularly useful to beginners. The 341 pages are closely packed with practical instructions and hints and include over 500 photographic reproductions with numerous line diagrams. Apart from its value to practical jointers the book is also suitable for use in technical institutes and colleges.

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Discounts for Decorators and Garages

The Electrical Fair Trading Council has now brought into the scope of the Fair Trading Policy decorators, decorative specialists and garages who handle lighting fittings and accessories. The Schedules affected are: No. 2, Electric Light Fittings (Ornamental and Decorative Types); No. 3, Electric Light Fittings (Industrial and Commercial Types); and No. 4, Electric Light Fittings Accessories.

It is stipulated that a decorator is not entitled to discount on any material covered by these Schedules unless he has an established electrical department with suitable premises and equipment for the business of selling and installing electrical products. Where a complete scheme has been prepared by a decoration specialist (who is registered as such by the Electric Light Fittings Association with the Fair Trading Council) in which electric light fittings form an integral part, provided that he accepts responsibility for choosing the fittings and paying for them on behalf of the client, a discount of 15 per cent. may be granted, in which case a reservation of 10 per cent. shall be made by the supplier to the electrical contractor who may prove himself entitled to it.

Garages are defined as any person, persons, company or firm having the necessary facilities and employing suitable labour to carry out the business of motor vehicle sale, service and major repair. For electrical material covered by the Schedules (other than that required for re-sale) purchased for their own use, they may be accorded the following discounts:—Schedule 2: 25 per cent. on the products listed under Category 1, and not exceeding 15 per cent. for showroom selection orders (Category 2). Schedule 3: 15 per cent., so far as industrial fittings and accessories listed in conjunction therewith are concerned; and 25 per cent. on commercial fittings comprising standard types of utility fittings (para. 5, Category 1). Schedule 4: 25 per cent.

Where depôts, such as filling stations, &c., do not regularly cater for the resale of electrical material and have none of the general facilities outlined above, net list prices shall apply.

A Large Stator for Dalmarnock

A 90-ton stator for the new Glasgow power station at Dalmarnock left C. A. Parsons & Co.'s Heaton works last Sunday. The stator, which is slung between two wagons to allow it to pass under bridges and through tunnels, is too large to allow for normal travel and the journey to Glasgow is being carried out only on Sundays.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable Making Industry announces that the July 1st cost-of-living figure (59 per cent. above the 1914 level) will not involve any alteration in wages on the third pay-day in August.

Burglar Alarms for Australia

A Sydney, N.S.W., firm tells us that it is anxious to secure the sole agency for a manufacturer of electric burglar alarms with door contacts, 6 to 9 in. gongs and bell indicators. We shall be pleased to pass on communications from any interested readers.

Fluorescent Lighting in a Garage

The accompanying photograph shows a section of the Holloway garage of Selfridge Provincial Stores, Ltd., in which a

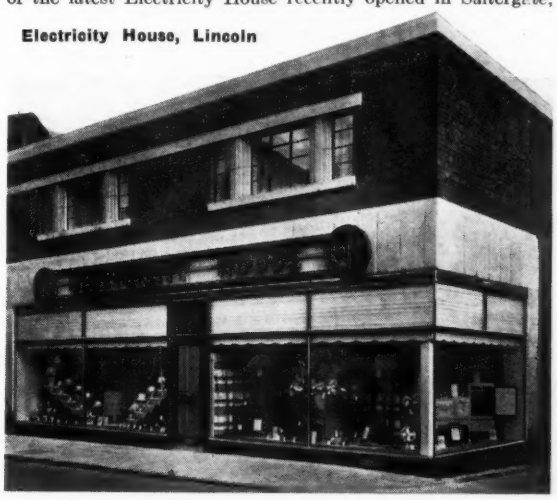
Fluorescent lighting at a Holloway garage

system of lighting by 400-W "Escura" colour-corrected fluorescent lamps of the isothermal bulb type has been installed, giving a daylight appearance. This was the only illumination used for taking the photograph. The lamps and equipment were supplied by the Edison Swan Electric Co., Ltd.

New Electrical Centre at Lincoln

Many prominent townspeople attended the private preview of the latest Electricity House recently opened in Saltergate,

Electricity House, Lincoln



Lincoln, and considerable general interest has been shown in this addition to Lincoln's shopping centre. The shop has five large display windows, with a fine 52 ft. frontage. It is situated in the new and up-to-date Savoy Cinema buildings, and covers an area of 1,720 sq. ft. In addition to very attractive showrooms, it embodies a large and well-lighted demonstration kitchen on the first floor, where washing and cooking demonstrations are given weekly. In both showrooms and kitchen effective use has been made of modern pink-tinted "Vitroflex" mirror glass, which makes a particularly good background for the display of the smaller electrical appliances.

Electrical Propaganda in Dumfries

June was an extremely busy month in electrical publicity matters for the Dumfries County Council Electricity Department, Mr. J. S. Pickles, the county electrical engineer, tells us. Early in the month over three hundred consumers had the benefits of electric cooking explained to them at "at homes" held at the Council's Annan showrooms, while a series of cold cookery demonstrations was given in various towns, the results being very gratifying. Short lectures on water heating were also given. The Department entered a tableau in the procession in honour of the town of Annan becoming a royal burgh, and also shared in the presentation of the "Electricity on the Farm" stand at the Highland Show held this year at Dumfries.

The Great Yorkshire Show

Great interest was evinced in the domestic electrical section at the Great Yorkshire Show, held at Doncaster last week. This was particularly true in regard to refrigerators, and despite the bad weather on the last two days many orders and enquiries resulted. Among the exhibitors were the Yorkshire Electric Power Co., Ltd.; Ruston and Hornsby, Ltd.; Petters, Ltd.; British Tractor Sales, Ltd.; H. Bushell and Sons; R. A. Lister and Co., Ltd.; Isaac Robson and Co., Ltd.; R. F. Winder, Ltd.; Alfa Laval Co., Ltd.; Melotte Sales Separators Co. (1931), Ltd.; John Norton and Sons; Westinghouse Refrigerators; Refrigeration Contracts, Ltd.; and John Mollett, Ltd.

Orders Recently Booked

The English Electric Co., Ltd., has recently received an order from the City of Durban for nine double-deck, seventy-seater trolley-buses with English Electric electrical equipment and bodies, and three-axle chassis of the Associated Equipment Co.'s manufacture. The bodies will be of all-metal construction with front and rear entrances; the width allowance of 8 ft. in Durban will permit luxurious seating accommodation and ample gangways. The control equipment will be of the English Electric Co.'s patented series dynamic type which provides smooth rheostatic braking. Another special feature will be the l.v. lighting generator which is overhung from the end of the main motor.

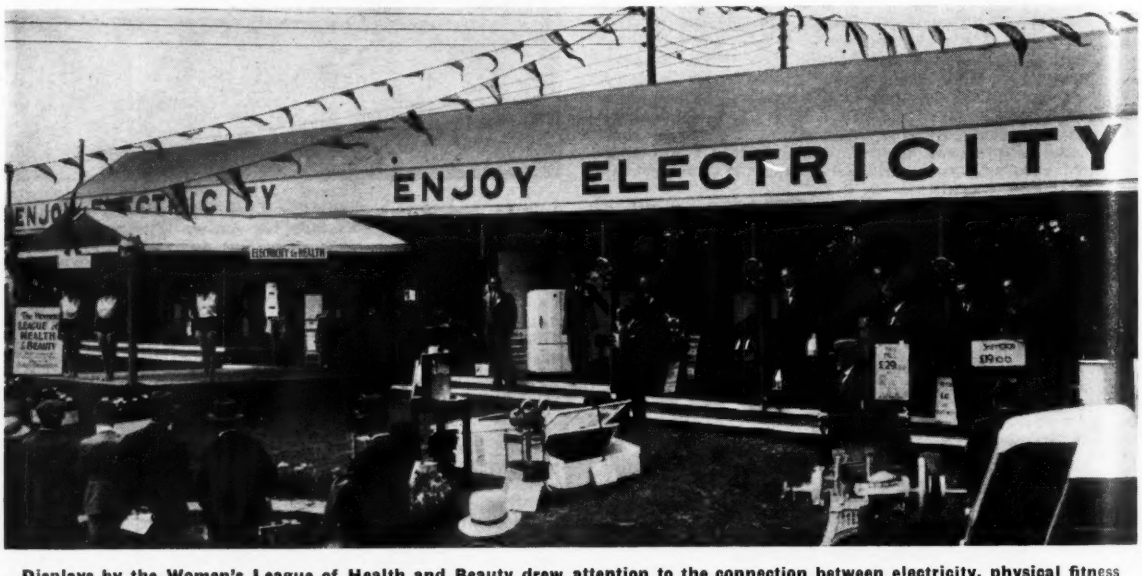
The New Zealand Government is placing contracts valued at £100,000 with British firms for engineering and electrical equipment, including electric train lighting equipment and lead-covered cabling.

An Exhibition at Nottingham

Among the exhibitors at the first City of Nottingham Exposition now being held at Nottingham Forest are the Corporation Electricity Department; Hoover, Ltd.; Tellus Super Vacuum Cleaner, Ltd.; Pearson Bros. (Nottingham), Ltd.; Hurley Machine Co. (England), Ltd.; Shires Electric Co., Nottingham; Wilkins and Mitchell; and Albert Tulip, Nottingham.

The French Electrical Industry

The Syndicat Général de la Construction Electrique reports that the general slackening in French activity in 1937 affected in different degrees all the branches of electrical construction. Taken as a whole, the index numbers of the tonnage of the orders for heavy plant, medium and small sized motors, transformers, &c., and medium and small apparatus were in immediate proximity and often below the lowest level reached since 1930. The financial difficulties experienced by the public authorities as well as private undertakings compelled them to reduce their programmes or defer their execution. After referring to the increases in the costs of production, the report states that the total exports amounted to 10,430 metric tons in 1937 of the value of 304 million fr., as compared with 8,750 tons and 210 million fr. in 1936, being an increase of 18.8 per cent. in weight and 45 per cent. in value. The French possessions overseas, including North Africa, absorbed 53.1 per cent. of the tonnage and foreign countries 46.9 per cent., these figures comparing with 57.3 per cent. and 42.7 per cent. in 1936. A notable expansion took place in the exports to Italy, China, Switzerland and Spain, but those to Yugo-Slavia, Poland and Russia declined. On the other hand, the imports totalled 5,700 tons of the value of 405 million fr., as against 4,650 tons and 265 million fr. in 1936, being an increase of 22 per cent. in tonnage and one of 52.6 per cent. in value. The growth in the imports from Holland, Belgium and Switzerland was specially noticeable.



Displays by the Women's League of Health and Beauty drew attention to the connection between electricity, physical fitness and feminine beauty at the electrical stand at the Kent County Agricultural Show held at Folkestone

Protecting the Eyes

Electric welding and cutting of metals are included in the schedule of processes to which the new Protection of Eyes Regulations, 1938, which come into force on August 1st, apply.

Vacuum Cleaner Display

A Vactric window display cut-out now available takes the form of a girl and is so designed that any of the range of cleaners can be used in conjunction with it, the impression being given that the model is actually using the machine.

Mining Engineers Visit Trafford Park

On July 14th, during the annual summer meeting of the Institution of Mining Engineers, a party of 150 members and their friends visited the works of the Metropolitan-Vickers Electrical Co., Ltd., at Trafford Park. They were received by Mr. B. L. Metcalf, who is in charge of the company's Mining Department. The ladies were shown the canteens and kitchens and then saw demonstrations of "Cosmos" lamps and the million-volt spark in the high-voltage research laboratory. Meanwhile, the gentlemen heard a short address by Mr. Metcalf on some of the demonstrations to be seen later. The visitors then toured the research department and the main assembly shops. Electric winders for South Africa were on view and a range of Buxton certified mining gear was also laid out in the switchgear, control and motor departments. The manufacture and testing of Lilly controllers were seen and a motor driving through a hydraulic coupling was demonstrated. The foundry, tank shop, transformer department and insulation department were also included in the tour. After lunch the guests received a welcome from Mr. Peck, director and chief engineer of the company, who mentioned that there were now approximately 16,000 employés at Trafford Park. Mr. Carlow, president of the Institution, responded.

Kent Agricultural Show

The electrical exhibit at the Kent County Agricultural Show held at Folkestone last week had the advantage of a particularly imposing and striking stand, occupying a space of 140 ft. by 40 ft. In addition, the travelling showroom of the County of London Electric Supply Co.'s associated companies was placed on the other side of the main avenue opposite the stand. High across the intervening space, visible over the entire showground, were the words "Use Electricity." The following undertakings took part in the exhibit: The Ashford, Canterbury, Dover, Faversham and Maidstone Corporations; the Herne Bay, Isle of Thanet and Whitstable Companies, and the associated companies of the County of London Electric Supply Co., Ltd., namely, Folkestone, South-East Kent, Kent Electric Power, Ramsgate, Sevenoaks and Weald. The Folkestone company was mainly responsible for the erection of the stand, and the South-East Kent Co. for the agricultural section, but all the undertakings collaborated in the provision of appliances. Demonstrations of these were given throughout the three days. The Electrical Development Association also contributed to the cost and assisted in the general arrangements, and the figure "I'm Electric" was personified by a young woman, who moved freely among the visitors, distributing literature. Adding to the attractions of the exhibit, the Women's League of Health and Beauty gave displays throughout the period, and Messrs. Bobby sent a "Beauty Parlour," these two contributions marking the alliance between electricity, physical fitness and feminine beauty. Flowers and playing fountains added to the picturesqueness of the stand. Fine weather was enjoyed during the greater part of the three days, and large crowds were attracted to the stand.

Social Events

For the second successive week the annual sports and fête of the North-Eastern Electric Supply Co., Ltd., was spoiled on Saturday owing to rain. On the first day the gathering was abandoned and on Saturday the programme had to be considerably curtailed. Mrs. Monkhouse, wife of Colonel S. E. Monkhouse, general manager of the company, presented the prizes.

The third annual horticultural show of the Henletel Social and Athletic Club was held last Friday. Although the number of entries did not come up to expectations, the quality of the exhibits showed a marked advance on previous years. Henley's directors accompanied Sir Montague Hughman to a preview of the show and in the evening prizes were distributed by Dr. P. Dunsheath.

The annual sports meeting of the Dubilier Athletic Sports Association was held last Saturday. There was a comprehensive programme of events with an enthusiastic number of entrants and amusing side-shows added merriment to the occasion. After the distribution of prizes dancing on the green brought a happy day to a close.

Long Service Employés

At the M.-V. Club on July 11th, Sir Felix J. C. Pole, on behalf of the Metropolitan-Vickers Electrical Co., Ltd., presented each of 105 employés (including four women) who had completed thirty-five years' service on December 31st, 1937, with a watch or clock. This mark of appreciation was received by three directors and a number of managers of departments as well as by staff and workpeople.

Aircraft Production

A field of ever-growing importance will be covered by a new journal, *Aircraft Production*, which is to be published by Iliffe & Sons Ltd. The scope of the paper will include design, production, management, inspection, materials, &c., and should be of interest to electrical engineers and others in the industry.

National Mark Cooking Demonstrations

A series of special cooking demonstrations was held last week by the Hull Electricity Department in conjunction with the Ministry of Agriculture and Fisheries' National Mark Campaign.

Prices of Materials

Henry Gardner & Co., Ltd., report, July 20th: Copper bars (best selected), sheet and rod, no change. English pig lead, £16 15s., 5s. inc. Spelter, £14 3s. 9d., 11s. 3d. inc. English block tin, £193 5s., £4 5s. inc. Mercury, no change.

Frederick Smith & Co., report, July 20th: Electrolytic copper bars, £44 10s., 15s. inc. Ditto, ditto, wire rods, £49, 15s. inc. Ditto, ditto, h.c. wire, 7½d., 1/16d. inc. Silicium bronze wire, no change.

Edward Till & Co., report, July 20th: India rubber, Para fine, no change.

Large Electric Motors

The manufacture of one of three large electric motors which are to be used for driving air compressors has just been completed in Edinburgh. The overall length of the motor is 16 ft., and its height 14 ft., while the total weight is about 40 tons. The motor will require 4,000 h.p. at starting and will operate on 11,000 V at a speed of 250 r.p.m. The manufacturers, Bruce Peebles & Co., Ltd., adopted the fabricated method of construction.

Encouraging British Clock Sales

Despite the attempted flooding of the market with cheap and often inefficient foreign electric clocks, most electrical dealers still prefer to sell British-made instruments which will not give trouble by their irregularity and will be a credit to them. An example of enterprise in this direction is shown by Messrs. Flinders, who, for the past fortnight, have arranged special displays of all-British electric clocks at their showrooms at Ipswich, Colchester and Norwich. The showrooms have been devoted entirely to "Sectric" clocks, and Smith's English Clocks, Ltd., have supplied various showstands and prepared three attractive wall panels showing a range of special wall clocks. Considerable business has already resulted.

The "Electrical Review" Index

The index to Vol. CXXII of the ELECTRICAL REVIEW (January-June, 1938) is now available. Any reader requiring a copy may obtain one free of charge from the Publisher, ELECTRICAL REVIEW, Dorset House, Stamford Street, S.E.1. Cloth binding cases may also be obtained at 3s. 6d. each (3s. 10d., post free).

Selling Electric Irons

A striking cut-out approximately 28 in. high by 28 in. wide has been produced by the Lightfoot Refrigerator Co., Ltd., for displaying the new Westinghouse "Silver Arrow" controlled heat iron. A large-scale reproduction of the most outstanding feature of the apparatus, namely, the "fabric-calibrated" heat control, is shown at the top, its various advantages being detailed beneath. Attention is also drawn to the iron's unbreakable body. Linked up with this cut-out are various manuals, folders, etc.

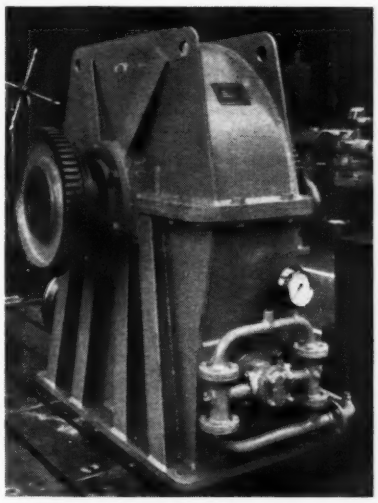
The Westinghouse "Silver Arrow" iron cut-out

English Electric Engineering Society

The annual general meeting of the English Electric (Stafford Works) Engineering Society was held recently. Mr. J. Rogers, general manager of works, who occupied the chair, conveyed to the meeting a message he had received from Mr. G. H. Nelson, chairman and managing director of the company, expressing his appreciation of the continued success of the Society. The hon. secretary, Mr. H. Stanier, reported that the membership last year was 837, this being an increase of 244. The officials appointed for the session were:—President, Mr. G. H. Nelson, M.I.E.E. Vice-presidents: Messrs. C. Hollander, J. Rogers, A. D. Sloan, and F. Wallis. Committee: Messrs. A. Elliott, S. C. Fudge, G. W. Graham, L. B. Mallalieu, F. L. Smith, E. J. Warner, L. B. Wood. Hon. treasurer: Mr. K. Love. Hon. secretary: Mr. H. Stanier.

A Large Arc Welding Job

The accompanying illustration shows an interesting type of gear unit which has recently been completed in the works of David Brown & Sons (Hudd.), Ltd., of Huddersfield. The unit is a large worm-reducing gear for driving the paddle wheels on a 125-ft. stern-wheeler motor vessel operating on the Nile. The case for the worm gear unit has also been built from steel plates, but the bearing housings in this unit are of cast steel, built in, the stiffening ribs, provided at the points of maximum stress, being made from tees. Like the other unit, the case is made in halves with accurately machined joints in order that the top half can be lifted clear without disturbing the gears and bearings. This well-designed, robust unit is electrically welded throughout. Another electric welding job recently completed by the company is a case for a massive double reduction rolling mill drive.



An electrically welded worm reducing gear

Annual Holidays

The Bradford works of the English Electric Co., closes this evening (Friday) for the summer holidays, and will re-open on August 2nd. The Stafford and Rugby works of the company will be closed from July 29th to August 8th, and the Preston works from August 5th to 15th.

The factory of Durex Abrasives, Ltd., will be closed for the week, July 30th to August 6th.

The Saxonia Electric Wire Co., Ltd., will close its works throughout the August Bank Holiday week.

The works of Brook Motors, Ltd., will be closed for the annual holidays from August 6th to 13th.

The Coborn Works of Kryn & Lahy (1928), Ltd., and J. Browett-Lindley (1931), Ltd., at Letchworth, Herts, will be closed from July 29th to August 8th. The company's offices will reopen on August 2nd.

The Rheostatic Co., Ltd., is closing its works and offices from July 29th to August 8th.

Wilfrid Francis & Co., Ltd., are closing their works this evening (Friday) until August 2nd.

Trade Announcements

The telephone number of the Benjamin Electric, Ltd., has been changed to Tottenham 5252.

The telephone number of Hogan & Wardrop, Ltd., has been changed to Clerkenwell 1336.

Dissolution of Partnership

Mr. L. Waddington and Mr. H. Midgley, radio and electrical dealers, 64-68, Morley Street, Bradford, have dissolved partnership. Mr. Midgley will carry on the business.

New Catalogues and Lists

Radiovisor Parent, Ltd., 28, Little Russell Street, London, W.C.1.—Details of the "Mark V" lighting control unit for traffic islands and bollards.

H. Ashton, Bull's Head Passage, Market Place, Manchester.—Particulars of air-purifying equipment.

Ruston & Hornsby, Ltd., Lincoln.—A catalogue of small vertical oil engines.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A catalogue of Fraser & Chalmers "Webb" conveyors, including full technical details.

Griffiths Bros. & Co. (London), Ltd., Bermondsey, London.—A booklet (139/J) dealing with "Armour" brand insulating varnishes.

British Insulated Cables, Ltd., Prescot.—Catalogues of trailing cables, mining type coupling boxes and turn-outs of trolley-bus lines.

Gent & Co., Ltd., Faraday Works, Leicester.—Booklets dealing with "Tangent" electro-motor syrens and staff locator.

Hick, Hargreaves & Co., Ltd., Soho Iron Works, Bolton.—An illustrated catalogue of rotary compressors and vacuum pumps.

Higgs Motors, Ltd., Birmingham.—A broadsheet of electric motors.

British Aluminium Co., Ltd., Adelaide House, London, E.C.4. A booklet dealing with aluminium bus-bars and connections.

Reduction of Capital

A petition presented to the High Court for confirming the reduction of capital of the M-O Valve Co., Ltd., from £100,000 to £50,000 is to be heard next Monday.

Receiver Appointed

J. A. Burrows & Co., Ltd.—J. W. Grayston, of Whitaker Buildings, New Victoria Street, Bradford, was appointed receiver and manager on July 1st, 1938, under powers contained in mortgage or charge dated April 8th, 1938.

Private Arrangements

Sellers of Leeds, Ltd., radio factors, Park Place, Leeds.—An informal meeting of creditors was held recently at the Law Institute, Leeds. The statement of affairs showed ranking liabilities of £13,215, including £6,222 to trade creditors, and on the basis of a going concern the assets were put down at £8,033, but at a break-up they were estimated to realise only £5,731. From the latter amount had to be deducted £244 for preferential claims, leaving net assets of £5,487, or a deficiency of £7,728. The issued capital of the company was £8,000. On the basis of a going concern the assets showed 11s. 8d. in the £ and at a forced realisation 8s. 4d. in the £. It was stated that the present position of the company had been largely brought about through the change in policy of the manufacturers on the wireless side of the business, which resulted in a substantial decline in the turnover during 1937 and 1938. Overhead charges, too, had been increased owing to the necessity which arose two years go to remove to new premises. A large stock of sets had to be disposed of at a sacrifice. An informal committee, consisting of the representatives of the Ever Ready Co., Ltd., General Electric Co., Ltd., H. W. Hallas, Kolster-Brandes, Ltd., and Richard, Son & Allwin, Ltd. is to be appointed to consider the position and evolve a scheme for recommendation to the general body of creditors.

J. W. Pillow, trading as the Wireless Stores, 21, Goose Gate, Nottingham, wireless dealer, &c.—The creditors interested were called together recently when a statement of affairs was submitted which showed ranking liabilities of £6,422. The net assets were £2,320, leaving a deficiency of £4,101. It was decided that the matter should be dealt with in bankruptcy, and that Mr. A. T. Eaves, C.A., of Harry L. Price & Co., 47, Mosley Street, Manchester, should be nominated for the appointment of trustee.

Grant & Blake, Ltd., electrical engineers, 5, Victoria Street, London, S.W.1.—A conference of the creditors was held recently when the statement of affairs showed ranking liabilities of £1,093. The net assets were £91, leaving a deficiency of £1,003. An offer was submitted of a composition of 2s. in the £, which was not accepted. After some discussion it was decided to accept a composition of 5s. in the £.

Company Liquidations

Olivers (Heanor), Ltd., Church Square, Heanor, radio dealers, &c.—At the statutory meeting of the creditors the statement of affairs showed ranking liabilities of £12,378. The net assets were £1,308, leaving a deficiency, as regarded the creditors, of £11,070. It was decided that the voluntary liquidation of the company should be continued with Mr. F. E. Bendall, of Poppleton & Appleby, and Mr. H. R. Horne as joint liquidators. A committee was also nominated.

Warner's Electrical Trust, Ltd.—Meeting of creditors July 23rd at the offices of H. Rainsbury & Co., Chiswell House, 133-139, Finsbury Pavement, E.C.2.

Radio Engineers, Ltd.—Winding up voluntarily. Liquidator, Mr. R. Russam, 38, Piccadilly, Bradford.

Baker's Selhurst Radio, Ltd.—Claims by August 27th to the liquidator, Mr. C. Latham, 185-8, High Holborn, W.C.1.

Bankruptcy Proceedings

F. Arrowsmith, 34, Great Moor Street, Bolton; 6, Bolton Street, Bury; 142, Blackburn Road, Accrington; and 8, Darwen Street, Blackburn, radio dealer.—A further sitting for this debtor's public examination took place recently at the Court House, Mawdsley Street, Bolton. At the previous hearing it was stated that the gross liabilities were £4,472, of which £2,396 was due to unsecured creditors, and there was a deficiency of £875. The debtor ascribed his failure partly to lack of capital. The examination was adjourned for the signing of the notes.

F. W. Hirst, radio dealer, lately 1, Newlands Buildings, Marton Road, Middlesbrough, Yorkshire.—The adjourned public examination was held recently at the Court House, Middlesbrough, and was closed. At the previous hearing the statement of affairs showed gross liabilities of £985 and a deficiency of £335.

J. B. Clements, radio and electrical engineer, 85, Church Street, Tewkesbury.—The receiving order was made recently on the debtor's own petition, and according to the statement of affairs returned there are ranking liabilities of £396 and net assets of £149, leaving a deficiency of £247. Debtor attributes his failure to illness and lack of trade. First meeting July 25th at the County Court Offices, Cheltenham. Public examination August 18th at the Court House, Cheltenham.

R. J. Horton, electrical engineer, 204, Coldharbour Lane, Brixton, and lately carrying on business at 308, Brighton Road, South Croydon, and 25, Chipstead Valley Road, Coulsdon.—Order made June 16th suspending discharge for one year until June 16th, 1939.

W. S. Poole, electrician, High Street, Queensbury, near Halifax, Yorkshire.—Trustee, Mr. W. F. Cresswell, Official Receiver, Hallfield Chambers, 71, Manningham Lane, Bradford, released June 29th.

T. N. G. Gelsthorpe, deceased, electric merchant's manager, 46, Devonshire Drive, Scarborough.—Last day for receiving proofs for dividend July 30th. Trustee, Mr. J. S. Snowball, Bank Chambers, Scarborough, Official Receiver.

J. Bolton, radio dealer, 88 and 90, Bolton Road, Blackburn.—Last day for receiving proofs for dividend July 27th. Trustee, Mr. H. S. Haworth, 7, Lord Street West, Blackburn, Official Receiver.

M. Healey, radio dealer, 51, Broomhill Road, Bulwell, Nottingham.—First and final dividend of 9s. 7½d. in the £, payable July 27th at 22, Regent Street, Park Row, Nottingham.

C. E. Moore (C. E. Moore & Co.), radio engineer, 35, High Street, St. Neots.—Supplemental dividend of 7s. 11¼d. in the £, payable at 41, Sidney Street, Cambridge.

Electricity Supply

Lighting, Domestic, Power

Bettws-y-Coed.—SALE OF UNDERTAKING.—The North Wales and South Cheshire Joint Electricity Authority has approved the sale of the Bettws-y-Coed Council's electricity undertaking to the North Wales Power Co. At a meeting of the Authority, held at Llandudno, Mr. G. K. Paton, manager and chief engineer of the company, said that the undertaking controlled by the Council was in serious difficulty. It was this which led the Council to approach the company to take the undertaking over. After negotiation it was agreed that the company should pay £550 for the undertaking. An expenditure of about £10,000 would be needed for the reconstruction of the electricity supply system at Bettws-y-Coed. The existing prices there were 4d. per kWh for lighting and 2d. for power. Under the company the area would be put on the Conway Valley tariff, which was 6d. per kWh for lighting. All the facilities offered by the company would be available in the district, and the average price for lighting, heating and cooking would be lower.

Bradford.—ELECTRICAL INSTALLATION.—The Assistance Committee is to install electricity at the Lillycroft and Killinghall children's homes.

SUB-STATION.—The Electricity Committee is to erect a sub-station and extend mains in Windermere Road, Great Horton, at a cost of £6,401.

Brighton.—SUB-STATION CONSTRUCTION.—A new sub-station is to be built by the Electricity Committee at West Way, Hangleton Estate West, Hove, at a cost of £3,335. Included in the equipment will be a five-panel high-voltage switchboard, a two-panel low-voltage switchboard and two 250-kVA transformers with automatic on-load tap changing equipment. Similar equipment but with four-panel high-voltage switchboards will be installed in two other sub-stations which it is proposed to construct, one in the Woodingdean area at a cost of £3,247, and the other, costing £6,344, in Hollingbury Road. The Committee has also authorised the engineer to replace the existing 250 kVA transformers at Longridge sub-station by two of 500-kVA capacity at a cost of £1,300.

Burton-upon-Trent.—INQUIRY.—On July 12th Mr. H. Nimmo, chief engineering inspector to the Electricity Commission, held a public inquiry at the Town Hall, Burton-upon-Trent, into the competing applications by the Derby and Nottinghamshire Electric Power Co. and Burton-upon-Trent Corporation for powers to supply electricity in parts of the rural districts of Repton and Shardlow, Derbyshire. Mr. A. D. Phillips, general manager of the company, said that in 1930 a Burton Corporation representative mentioned that the Corporation was interested in the Ticknall area. There was no great competition for it as it was sparsely populated, but as nothing was done in the intervening years and his company was receiving criticisms for not supplying the area it decided to apply for a Special Order. Mr. T. Hall, borough electrical engineer, said that in 1930 it was first mentioned that Burton should supply Ticknall, but the matter of applying for an Order was delayed because the owner of the majority of the property would not agree to the assisted wiring scheme proposed. The inspector later visited the district.

Bury St. Edmund's—COMPANY TO PURCHASE UNDERTAKING.—The consent of the Electricity Commissioners now having been received, the Town Council has finally approved the sale of the electricity undertaking to the East Anglian Electric Supply Co., Ltd.

Darwen.—REVISED TARIFF.—The principal feature of the tariff revision which we mentioned in our last issue is the introduction of a new scale to replace the existing all-in rateable value system for domestic consumers. Instead of a fixed charge based on the rateable value the scale provides for the payment of 4d. per kWh for a certain number of kWh varying according to the rateable value in £1 steps from £3 to £100. All consumption in excess of this stipulated figure is charged for at ½d. per kWh in winter and ¾d. in summer. The number of "fourpenny units" in the summer quarters is fixed at about half that for the winter quarters. Thus for a £3 house the figure for a winter quarter is 40 and for a summer quarter 20. For a £50 house the numbers are 173 and 86 respectively, and for a £100 house 287 and 144. The scale is not applicable to consumers with lighting only. Where houses are used also for professional purposes, such as in the case of dentists and doctors, 20 per cent. is added to the scale of units at 4d. Mr. F. M. Fletcher, borough electrical engineer, in sending us the information, says: "It will be seen that the new scale eliminates all fixed charges, percentages and minimums, and enables consumers down to assessments of £3 per annum to obtain the benefits of such a scale and, in my opinion, such scale obviates the objections normally raised by consumers to the ordinary percentage r.v. scale." Among the other rates shown in the new schedule is one of ¾d. per kWh for vehicle-battery charging (with restricted supply).

Edinburgh.—NEW TURBO-ALTERNATOR.—A proposal to purchase a new turbo-alternator for the Portobello power station at a cost of £28,000 was approved by the Public Utilities Committee last Friday. Mr. Edwin Seddon, city electrical engineer and manager, stated that in 1927 they had a breakdown on No. 2 turbo-alternator. A very good repair was carried out at

the time, but it was known then that this would last only a few years before they would have to consider replacing the turbine. The machine had run more or less satisfactorily up to date, but a recent examination had shown that there was considerable risk in continuing to operate the machine in its present state. The manufacturers had offered to replace the turbine at a reasonable price, which was now accepted. The new machine will have an output of about 2,500 kW more than the existing unit.

Epsom.—HOSPITAL INSTALLATION.—It is proposed to complete the renewal of the installation at the London County Council's Long Grove hospital. The work to be done comprises the renewal of the main lighting cables, the main distribution boards and the road lighting, together with the rewiring on modern lines of all wards, administrative sections, residences, &c., for electric lighting, telephones, fire alarms, pegging clocks and emergency and call bell systems. The estimated cost of the work, which will be carried out by the hospital engineering staff assisted by temporary labour, is £21,630.

Germany.—UNDERGROUND POWER STATION.—A hydro-electric scheme recently completed on the River Iller at Steinbach includes a power station which has been built underground. Designed by Herr Arno Fischer, of Munich, it will have an output of approximately 25 million kWh annually and the operating costs

A section of the underground generating plant at Steinbach, Germany

are said to be considerably lower than usual. It is the second of its kind to be constructed in Germany.

Gravesend.—SUPPLY DEVELOPMENT.—The Electricity Department is to lay new mains at Northfleet for affording supplies to 122 houses to be erected by the Urban District Council. The estimated cost is £2,500. An undertaking is to be given that all houses will be wired for electric cookers.

Gt. Yarmouth.—HERRING COOKERY DEMONSTRATIONS.—Regarding the proposed herring cookery demonstrations, the borough electrical engineer recently informed the Publicity Committee that the Electricity Committee was willing to lend all electric cooking equipment free of charge, and that the Herring Industry Board would also consider offering the services of an expert demonstrator, free of charge. After considerable discussion it was agreed to ask the Property Committee to grant the free use of the Assembly Room of the Town Hall from August 15th to 20th (inclusive) for the demonstrations.

Harwich.—A BIG INCREASE IN OUTPUT.—During the past year the output of the municipal electricity undertaking, excluding energy supplied to the L.N.E.R., showed an increase of about 35 per cent.

LOWER UNIT CHARGE.—The Town Council has approved a reduction in the "unit" charge of the two-part tariffs from ½d. to ½d.

DEVELOPMENTS.—The Town Council is to make application for permission to borrow £3,000 for meters and £4,000 for mains and services.

Hebburn-on-Tyne.—HOUSE INSTALLATIONS.—The Urban District Council is to install electricity in 123 houses.

Iceland.—ELECTRIC COOKERS.—Since the starting up last October of the large hydro-electric power station on the River Sag the resultant cheapness of power has induced a large number of people to adopt electricity for cooking. During the past nine months the sale of electric cookers in Reykjavik, which has a population of about 30,000, has exceeded 1,500. The increase in consumption has necessitated further expansion of the water-power plant, and it is reported that a new 4,000-h.p. hydro-electric station, estimated to cost two million kroner, is to be built on the River Borafoss.

India.—HYDRO-ELECTRIC DEVELOPMENT IN BOMBAY PRESIDENCY.—It is understood that the Government of Bombay has appointed an expert committee consisting of Mr. R. G. Hyans, electrical engineer to the Government, Mr. R. B. Advani, director of industries, and Mr. Gadre, executive engineer, to survey the waterfalls in the Presidency and to report to Government where the generation of electricity is feasible. The committee has been asked to submit its report within six months.

Isle of Man.—TARIFF NEGOTIATIONS.—The Isle of Man Electricity Board is negotiating with the Douglas Corporation for a revision of the tariff under which electricity is supplied to the Board. If a satisfactory settlement is arrived at the Board will be in a better position to face the extensions now asked for in the very sparsely populated districts. Its annual report discloses that there are now 3,329 consumers, an increase of 658, and the amount of electricity used by the average private consumer has increased from 482 to 563 kWh. Over 1,000 cookers, wash-boilers, refrigerators, and similar appliances have been hired from the Board, and it is estimated that more than 3,000 electric fires, kettles, irons, &c., have been obtained from private contractors.

Leigh.—LOWER CHARGES.—The Council has authorised a reduction in the price of electricity for lighting from 4d. to 3½d. per kWh, following the presentation of the undertaking's accounts which show a net profit of £12,761, against £8,873 in the previous year.

London.—LEWISHAM.—At a meeting of the Borough Council a proposal to substitute electricity for gas for the lighting of all thoroughfares except the main roads (these have already been provided for) was adopted. The cost is estimated at about £42,400 with maintenance charges of £10,500 per year. The work is to be carried out by the South Metropolitan Electric Light & Power Co., and will take two years.

HAMMERSMITH.—The Housing Committee has accepted an offer by the Electricity Committee to install the necessary rising and sub-mains in flats to be erected on the site of the Becklow Place clearance area. The Electricity Committee will bear half the cost, on the understanding that all-electric facilities will be provided.

An application has been received for an additional supply of 70 kW for lighting and auxiliary heating at the Old Oak L.C.C. School. As the low-voltage cables in the street are of insufficient capacity it will be necessary to take a high-voltage supply to a sub-station to be provided on the premises.

The increase in the demand for electricity on both the Old Oak and Wormholt estates has been considerable since consumers were canvassed for the installation of electric cookers and water heaters, and it is anticipated that both the high-voltage mains and sub-stations will be fully loaded during the coming winter, with no reserve capacity in case of breakdown. The supply to the Old Oak estate, which comprises 1,036 houses, is provided from one sub-station which is now insufficient, and it is proposed to erect an additional sub-station and to lay a new high-voltage cable between the existing and new sub-stations and another to be erected on the "White City" housing estate of the London County Council. With regard to the supply to the Wormholt estate, it is proposed to lay a new high-voltage cable between the Milfoil Street sub-station and that to be erected on the "White City" estate and to replace an existing cable with one of a larger capacity. The total estimated cost of these works is £4,954.

Chambon, Ltd., have applied to the Department for an additional supply of electricity and also for a three-phase supply to be afforded to the company's Riverside works. To do this it is proposed to lay a new cable to the company's sub-station, to replace the existing transformer at the sub-station by a bank of Scott-connected transformers, and to provide the requisite additional switchgear. The estimated cost is £377.

It is proposed to standardise the rentals and sizes of water heaters hired to consumers and, in addition, there will be an alternative system under which the hire charge will cover the complete installation (at present, the rentals for water heaters exceeding 1½-gallon capacity, with the exception of immersion heaters, cover the apparatus only).

The Electricity Committee recently considered a letter received from the Coastal Trade Development Council requesting that, in the interests of the employment of British seamen and shore-workers, preference should be given to British ships whenever coal contractors carried their supplies coastwise, and suggesting that a clause should be incorporated in the form of contract for coal supplies stipulating that British ships should be used by the contractors. The Committee has given instructions for a clause on the lines indicated to be incorporated in future contracts for the supply of coal to the Electricity Department.

Macclesfield.—SPECIAL ORDER.—The Electricity Company of Macclesfield, Ltd., has informed the Macclesfield Corporation that it is not prepared to agree to the Corporation's proposal to seek a Special Order postponing for one, or two, years the Corporation's right of purchase of that part of the undertaking which it is at present entitled to on August 18th, 1939. Mr. Arthur Collins, of London, has been engaged to advise the Corporation.

Millom.—NEW TANNERY.—The erection of a tannery in the area of the Millom electricity undertaking has made the present source of supply (a local ironworks) inadequate, and arrangements are being completed by the electrical engineer, Mr. T. Penman, for obtaining a bulk supply from the Barrow-in-Furness Corporation. The tannery will eventually use about 360,000 kWh a year, and the new supply will open up possibilities for greater development generally. The charge to the tannery is to be 1d. per kWh, subject to a minimum of 10,000 kWh a month for the first three months, 15,000 kWh a month for the second three, and 20,000 kWh a month for the third

three months. Charges to Millom householders are expected to be reduced as a result of the bulk supply.

Retford.—SODIUM STREET LIGHTING.—A system of lighting by means of electric-discharge lamps of the sodium vapour type has been installed in the Great North Road by the Town Council.

Rushden.—ELECTRICITY FOR COUNCIL ESTATE.—Following the receipt of a memorial signed by 131 tenants on the Newton road housing estate asking that their houses might be wired for electricity, the Urban District Council has given its consent provided that the whole of the cost is borne by the tenants, as was the case on the King's Road housing estate.

St. Austell.—REDUCED CHARGES.—An announcement has been made by the electricity company that as from the mid-summer reading of meters the charge for electricity under the company's all-in tariff is being reduced to ¾d. per kWh.

Scotland.—ELECTRICITY BILLS.—The Lochaber Water Power Provisional Order has been made and issued by the Secretary of State with amendments in clauses 25, 27, and 30 of the modified draft Order. A Bill to confirm the Order was introduced into Parliament on July 7th, and will follow the procedure prescribed.

Opposition to the River Cart Navigation Provisional Order, promoted by Paisley Town Council in order to develop the waterway for trading and shipbuilding, has now been withdrawn. All differences have been adjusted with the petitioners against the proposed Order, among whom were the Clyde Valley Electrical Power Co. and the Strathclyde Electricity Supply Co., Ltd.

Southend.—CONTRIBUTIONS TO RATES.—In a report which he has submitted to his Council, Mr. A. C. Johnson, the Southend borough electrical engineer, states the case against the policy of ensuring a balance in the electricity undertaking's accounts to enable regular contributions to be made to the rate fund. Referring to the heavy capital expenditure incurred in advance of the demand (which has proved a wise step), he says that with favourable trading conditions the undertaking will show a small credit balance in 1939-40. He contends that this can only be achieved by keeping the price of electricity down. To raise the reserve fund to the statutory minimum, cover the estimated deficit for 1938-39, contribute £13,300 to the rates, and meet increased income-tax would require a net addition to the revenue of £29,055, representing a general increase of 9 per cent. in charges. In view of the keen competition such an increase would have an adverse effect on the undertaking. Only those ratepayers who do not use electricity would benefit by the addition of further sums to the £83,000 which electricity consumers have already contributed to the rates. One point made in the report is that the undertaking already pays £27,000 per annum in rates, being very highly assessed in comparison with the average electricity undertaking.

Stoke-on-Trent.—MAINS.—The Electricity Committee is to extend its mains at a cost of £950 to supply 227 houses to be erected on the Trent Vale Farm estate.

Stockton-on-Tees.—LOANS.—Application has been made by the Town Council for sanction to borrow £4,750 (£3,850 for buildings and £900 for equipment) for a proposed meter-testing station.

Swansea.—NEW EQUIPMENT AT POWER STATION.—The Electricity Committee is to provide additional switchgear and motor equipment at the power station at a cost of £20,000, increase the coal plant (£5,000), and alter the boiler plant (£2,000). A building is to be constructed for coal sampling, crushing and reducing plant at an estimated cost of £750.

Taunton.—APPARATUS ON HIRE.—Approval has been given to a recommendation of the Electricity Committee to apply for sanction to a further loan of £20,000 for the provision of domestic apparatus on hire.

SUB-STATION.—A site in Priorswood Road is to be purchased for a transformer sub-station.

Communications

Germany.—TELEVISION-TELEPHONE SERVICE.—A television-telephone service over cables with repeaters at every 35 km. was opened between Berlin and Munich last week. Faces of people in conversation over the 400 miles or so appeared clearly on a cathode-ray tube screen at each end, but distortion was noticeable, the faces appearing broader and wider and the forehead lower. Scanning is by mechanical means, a light spot being used. The definition is 180 lines and 25 frames per second, resulting in a certain amount of flicker. The image frequency is impressed on a carrier, and the signal is transmitted after the upper side-band has been suppressed. Styroflex and ceramic insulating disc cables are used. To provide for the 441-line broadcasting television standard it will be necessary to have repeaters at every 17.5 km. The price of a three-minute conversation is Rm.4.80, plus Rm.0.80 for notifying the called person. Only one conversation is at present possible at a time. People wishing to speak and see from Berlin to Leipzig or Nuremberg while a Munich-Berlin conversation is taking place have to wait their turn. The service to Nuremberg and Leipzig has been in operation for some time, and it is proposed to extend the system to Cologne, Hamburg, and Frankfurt very shortly.

Great Britain.—TELEVISION AT "RADIOLYMPIA."—The B.B.C. announces that special television programmes will be radiated daily from "Radiolympia," by arrangement with the Radio Manufacturers' Association, from August 24th to September 3rd inclusive. For this purpose the R.M.A. is erecting in the National Hall a large television studio, with glass walls which will enable visitors to see television programmes in production on the studio floor. For the first time, two mobile television units will be in use during the Exhibition. One will be installed at Olympia to relay the programmes thence to Alexandra Palace for retransmission, and the other will be operating first at the Kennington Oval for the final test match, and later at the Zoo to provide two half-hour animal programmes daily.

India.—BROADCASTING IN BARODA STATE.—It has now been decided to have an up-to-date broadcasting station for the State, and the Government has sanctioned an expenditure of Rs.1½ lakhs on its construction.

United States.—RADIO INTERFERENCE.—The New York correspondent of the *Wireless and Electrical Trader* states that the Committee on General Welfare of the City Council is considering a proposed by-law for dealing with radio interference. It empowers the Police Commissioner to give notice to persons responsible requiring that the interference shall be eliminated, subject to the expense not exceeding $15. If this is not complied with there will be a maximum penalty of $50. At Washington, Oregon, Vermont, and Hawaii such powers already exist.

Traction

Bradford.—TRANSPORT ACCOUNTS.—The Corporation made a net profit of £27,929 on its transport undertaking during the year, compared with £33,717 in the previous year. There was a loss of £2,430 on the tramways, a profit of £7,436 on the trolley-buses, and a profit of £22,904 on the motor-buses. A record was established in gross revenue, miles run and passengers carried.

Brighton.—VOLK'S RAILWAY.—The General Purposes Committee has included in a Parliamentary Bill powers authorising the Council to operate Volk's Railway and to alter and add to or rebuild it.

London.—NEW AUTOMATIC CONTROL SYSTEM FOR LONDON TRANSPORT.—When the London Passenger Transport Board signed a contract last week for the supply of £32,000 worth of automatic telephone equipment it took the first step towards reorganising the control of the underground railways. The Board's present telephone system will be made completely automatic, and the number of automatic telephones will be increased from 670 to 1,795. The whole scheme will cost £150,000 and will take eighteen months to install. Special consideration is being given to the protection of the system against damage in the event of air raids. Instead of the decentralised system of traffic control now in use there will be one master control room at the Leicester Square station. Four traffic controllers seated in this room will have direct communication by automatic telephone with the booking halls and platforms of 300 stations, every signal cabin, sub-station and key point. They will be able to cut into any conversation on the railway telephones to speak to an official who is needed urgently. In an emergency, they will be able to press a key and talk, through loud speakers, to the ticket offices of every important station. Their message will be relayed to the remaining stations by telephone, according to a pre-arranged plan. The telephone facilities on the Metropolitan line and on the main-line railways over which the Board will begin to run trains in 1939-40 will be modernised to deal with the intensive services to be introduced. The Board's signal engineers, who have planned the new system, estimate that only a few minutes will be required to give a message to every station, from Amersham and Ongar in the north to Wimbledon and Morden in the south. The contractors for the telephone equipment are Ericsson Telephones, Ltd.

Wolverhampton.—TRANSPORT REPORT.—During the past year the Corporation trolley-buses carried 48.5 million passengers and the motor-buses 10.9 million. The trolley-buses maintained a higher average speed than the buses (9.233, against 8.633 m.p.h.) and covered 121 miles per day per vehicle as compared with 94 miles in the case of motor-buses. The average fare charged per mile on the trolley-buses was 0.932d. and on the motor-buses 1.052d. The trolley-bus working expenses amounted to 71.76 per cent. of the total revenue and in the case of the motor-buses 77.49 per cent. Per vehicle mile the revenue worked out at 15.351d. and 13.954d. respectively, working expenses being 11.016d. and 10.814d. The gross surplus on the trolley-bus account was £80,278 and on the motor-bus account £19,910, a total of £100,188, and after debiting the interest on capital, repayment of loans, income-tax on profits, &c., there was a net surplus of £14,169, of which £10,000 has been applied in aid of the rates. At the end of the year the Department, of which Mr. C. Owen Silvers is the general manager and engineer, had in stock 125 trolley-buses and 62 motor-buses, and the average numbers used each day during the year were 101 and 48.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aldershot.—August 2nd. Borough Council. Wiring of the laundry block in course of erection at the Isolation Hospital, Cemetery Road. (July 15th.)

Australia.—SYDNEY.—September 28th. Department of Railways (Electrical Branch). Turbo-alternator, surface condenser, feed-water heaters, &c., for Ultimo power station. (T. 23984/38.)*
September 1st. County Council. 120/11,000-V metal-clad oil circuit-breaker switching equipments. (T. 23987/38.)*
MELBOURNE.—August 8th. City Council. Three-phase transformers. (T.Y. 24257/38.)*
BRISBANE.—September 20th. City Electric Light Co. 44-kV and 11-kV switchgear. (T. 24209/38.)*
VICTORIA.—August 9th. State Electricity Commission. Voltage regulating equipments. (T.Y. 24462/38.)*

Belfast.—July 29th. Electricity Department. Steel fire-resisting partition, portable loading elevator, and replating storage battery cells at Harbour power station. 33-kV indoor and outdoor switchgear and interconnecting cables, 33-kV underground cables and pilot and telephone cables. (July 8th.)

Birmingham.—August 11th. Electric Supply Department. Electric cooker control units for twelve months. (July 15th.)
August 22nd. Railway sidings, including embankments, concrete bridges, river diversion and roads at the Hams Hall "B" power station. (See this issue.)

Blackpool.—July 25th. Borough Council. Stores and materials, including electrical sundries. (July 8th.)

Burnley.—July 29th. Borough Council. Installation of electrical wiring at Towneley Senior Boys' School. (July 15th.)

Dublin.—September 23rd. Commissioners of Public Works in Ireland. Field lighting equipment for the Dublin Airport, Collinstown. (July 15th.)
August 26th. Electricity Supply Board. Circuit-breakers, isolating switches and compressed air operating equipments and instrument transformers. (July 15th.)

Dumfries.—July 26th. County Council. Electrical works at Annan Infectious Diseases Hospital and High School and St. Andrew's Boys' and Girls' Schools. County Clerk.

Dundee.—August 10th. Electricity Department. Three-core, h.v. and multi-core, l.v., p.i., lead-covered cables. (See this issue.)

East Ham.—August 13th. Borough Council. Electrical installation in connection with the alterations and additions to the Hart Sanatorium, Woodford Green, Essex. (July 8th.)

Egypt.—CAIRO.—August 3rd. Ministry of Public Health. Electrical equipment for the electrical installation extension at Fayoum. (T. 23674/38.)*

Gainsborough.—August 13th. U.D.C. 6.6-kV metal-clad switchgear. (July 15th.)

India.—SIMLA.—July 30th. Indian Stores Department. Insulating materials. (T. 23759/38.)*
August 6th. Electric lamps for twelve months. (T. 24233/1938.)*

Kirkcaldy (FIFE).—August 4th. Corporation. Electrical work at hall, Park Road housing estate. Town Clerk.

Leeds.—August 3rd. Corporation. Electrical installation at the new theatre suite, electrical and massage block at St. James's Hospital. Town Clerk, Room 57, Civic Hall (deposit £2 2s.).

London.—ISLINGTON.—August 10th. Borough Council. Electric wires, conduits and other accessories. (July 8th.)
August 24th. Metropolitan Water Board. Pumping plant, &c., at the Hampton pumping station, Middlesex. (July 15th.)

Newcastle-under-Lyme.—July 27th. Electricity Department. Two mercury arc rectifier equipments and one l.v. and three e.h.v. switch cubicles. (July 15th.)

New Zealand.—WELLINGTON.—September 28th. Posts and Telegraph Department. Seventy-five secondary cells. (T.Y. 24226/38.)*
September 29th. Porcelain or composition insulators and caps. (T. 24227/1938.)*
October 3rd. 1,000 trembler buzzers. (T.Y. 24294/1938.)*
November 1st. 50-kV outdoor steelwork and switchgear. (T.Y. 24300/1938.)*
September 27th. 5,500 condensers. (T.Y. 24225/38.)*
September 29th. 5,000 telephone coils. (24228/38.)*
August 30th. Public Works Department. Four 11-kV switches. (T. 24288/1938.)*
November 1st. Remote control and metering equipment. (T. 24495/38.)*
November 8th. 10,000-kVA transformer bank for section 458 of the Mangahao scheme. (T. 24496/38.)*
November 15th. Indoor switchgear and control equipment for Waitaki power station. (T. 24497/38.)*
CHRISTCHURCH.—September 6th. Municipal Electricity Department. 11-kV sub-station switchgear and supervisory control equipment. (T.Y. 24293/38.)*
OTAGO.—November 30th. Harbour Board. One or two five-ton electric wharf cranes. (T. 24292/1938.)*

Peebleshire.—August 15th. Education Committee. Heating and electrical installation at new central school, Innerleithen. Reid & Forbes, 17, Great Stuart Street, Edinburgh.

South Africa.—PORT ELIZABETH.—August 25th. City Electrical Engineer's Department. Two 3,000-kVA transformers. (T. 24373/38.)*
JOHANNESBURG.—August 17th. City Council. Eleven oil-immersed circuit-breakers. (T.Y. 24691/38.)*

Southampton.—August 16th. Electricity Department. Conversion of lifts from d.c. to a.c. supply. (July 15th.)

Tredegar.—August 3rd. U.D.C. Electric cookers. (See this issue.)

Uruguay.—MONTEVIDEO.—August 2nd. Electricity Supply and Telephones Administration. 11,700 electric light switches and 5,950 separate covers. (T.Y. 23732/38.)*
August 3rd. 30,900 metres of lead-covered conductors. (T.Y. 24170/38.)*
August 9th. 58,000 metres of h.v. and l.v. underground armoured cables. (T.Y. 24262/38.)*

Wallsend.—North-Eastern Electric Supply Co. Electrical work in 264 houses. P. L. Browne, Son and Harding, architects, Pearl Buildings, Northumberland Street, Newcastle-on-Tyne.

Walthamstow.—July 23rd. Borough Council. Hydraulic and other machinery and piping and electrical equipment in connection therewith at the Concrete Flag Works, Low Hall Farm, Town Clerk (deposit £2 2s.).

Warwick.—July 29th. County Council. Heating and electrical work for the Council. (July 15th.)

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Alyth (PERTHSHIRE).—Town Council. Accepted. Electrical work at housing estate.—W. Hindmarsh.

Bradford.—Electricity Committee. Recommended. One 2,000-A switch for the Valley power station.—A. Reyrolle & Co. Switchgear for twelve months.—English Electric Co.; A. Reyrolle & Co.

Brighton.—Public Assistance Committee. Accepted. Rewiring block "A" of Elm Grove Home (£745).—Page & Miles.
Mental Hospital Committee. Accepted. Electrical installation at colony premises (£243).—H. J. Galliers. Installation of Diesel-alternator at colony (£657).—Crossley Bros.

Dorchester.—Electricity Committee. Accepted. Cables (£258).—Hackbridge Cable Co.

Dunton.—L.C.C. Accepted. Electrical installation at farm colony (£502).—Wm. Steward & Co.

London. — BATTERSEA. — Electricity Committee. Recommended. Electric vehicle (£245).—Associated Electrical Vehicle Manufacturers.
HAMMERSMITH.—Electricity Committee. Recommended. E.h.v., three-phase, 11,000-V, metal-clad switchgear (£2,103).—Allen, West & Co.
L.C.C.—Provision and erection of an electric bed-lift in block C, Grove Park Hospital, Lee:

	£		£
Evans Lifts. Accepted	999	Express Lift Co.	1,224
Pickerings	1,165	J. and E. Hall	1,260
Marryat and Scott	1,168	Waygood-Otis	1,280

Education Committee. Accepted. Electrical installations: Dalston secondary school (£1,826).—Johnson & Tanner. Forest Hill central school (£1,041).—E. & C. Champion. Southern Grove school, Limehouse (£1,139).—Ilford Electrical Co.

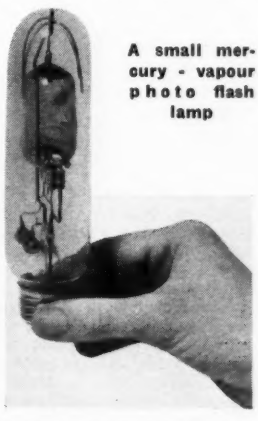
Manchester.—Transport Committee. Accepted. Cadmium copper wire.—Johnson & Nephew, Ltd.

Northampton.—Northants County Council. Accepted. Installation of an electric lift at the county offices (£489).—Evans Lifts, Ltd.

Swansea.—Electricity Committee. Accepted. Meter testing apparatus (£950).—Met.-Vick. Electrical Co.

A Permanent Photo Flash Lamp

A MERCURY-VAPOUR photographic lamp, measuring about 1½ by 6 in., which has been developed by the Westinghouse Lamp Co. in the United States, but which is not yet available commercially, combines a photo-flood lamp with a photo-flash lamp that may be flashed as often as required instead of being exhausted in a single flash, as are existing types. Used as a continuously operated floodlight, the lamp is rated at 100 W, at which it produces 3,000 lumens, but the output makes provision for passing high momentary current discharges through it, resulting in a flash at peak brilliance of about 500,000 lumens with an average brilliancy of 300,000 lumens. The flash can be timed with the opening of the camera shutter. The lamp may thus be used for general lighting while posing the subject and focusing the camera and then be flashed for the actual photograph.



A small mercury - vapour photo flash lamp

Notes

Developments in the Coal Industry

In P.E.P. Broadsheet No. 127 is outlined a quantitative assessment of recent progress in the coal industry. It deals with questions of costs, employment and productive efficiency, and shows that mechanisation continues steadily with a substantial increase in the use of electricty underground. Export markets are dealt with and a comparison is made with other European countries. Of the sixteen pages, four are allocated to tables of recent statistics relating to conditions at home and abroad. The number of electrical coal cutters is shown to have risen and that of compressed-air cutters to have fallen between 1934 and 1936. A much greater rate of increase of electrically driven mechanical conveyors below ground, compared with compressed air, is also recorded. The consumption of coal at electricity generating stations in 1937 is given as 14.75 million tons, which is a somewhat higher percentage of the total of 181.78 million tons absorbed by the home market than was the 11.17 million tons used in 1934 out of a total of 161.48 million tons.

Markham Pit Explosion

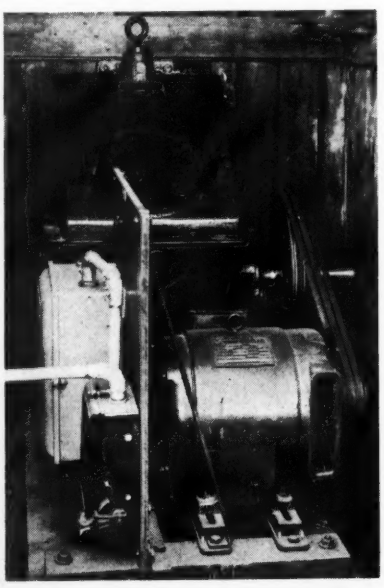
Giving evidence at the Mines Department inquiry into the cause of the explosion on May 10th at Markham Colliery, nr. Chesterfield, Professor H. Cotton said that even if all the motors connected to one cable had been running at the same time there would still be a margin of safety in regard to overload. There was, he said, nothing in the electrical equipment that could have been a source of danger in the pit. If electricity were the cause of ignition, it must have been due to the breaking of a joint box.

Non-destructive Testing

The Joint Committee on Materials and their Testing has arranged for a meeting to be held on November 25th under the auspices of the Institution of Electrical Engineers for the discussion of non-destructive testing in three sections, namely, magnetic and electrical methods, X- and gamma-rays, acoustical and general methods. The first will be dealt with in papers by Dr. B. Berthold, director of the Reichs-Röntgenstelle, Berlin, and by Dr. A. P. M. Fleming and Mr. B. G. Churcher; X- and gamma-rays will be dealt with by Mr. J. E. de Graaf, of Philips' Gloeilampenfabrieken, Holland, and Dr. V. E. Pullin; while acoustical and general methods will be dealt with by Prof. Köster, of the Kaiser-Wilhelm-Institut für Metallforschung, Stuttgart, and Dr. S. F. Dorey. The experience of the United States will be presented in a joint paper by Mr. N. L. Mochel, of the Westinghouse Co., Mr. H. H. Lester, senior physicist, Watertown Arsenal, and Mr. R. L. Sanford, chief of the Magnetic Section, National Bureau of Standards. Dr. A. P. M. Fleming (president, I.E.E.) will be in the chair, and all interested are invited to attend.

The Stroud Swimming Pool

In a new public park at Stroud is a swimming pool measuring 165 ft. by 60 ft., for which the whole of the electrical installation was carried out by Mr. H. F. S. Howell, of Stroud. The main control panel is housed in the first-aid room and comprises a fabricated steel framework carrying the supply company's meters and various iron-clad main control switch-fuses of G.E.C. manufacture. Steel-armoured, paper-insulated underground cables are used to provide the lighting supply to the tea pavilion and kitchens, while similarly constructed cables feed the three-phase power to the filtration house, where they are connected to iron-clad switch-fuses and distribution boards. The main circulating pump motor is 20 h.p. of the slip-ring variable-speed type, while a 2-h.p. induction motor is coupled to the suction unit. An overhead supply line, consisting of creosote-impregnated poles and paper-insulated conductors, has been constructed from the filtration house to the site chosen for the pumping plant. A bore-hole of 8-in. diameter was drilled to a depth of 65 ft. and a perforated steel liner inserted. Temporary pumping plant was installed and a continuous test made for 96 hr. to prove that a dependable water supply was available. The permanent plant was then fitted, and this consists of a Lister deep-well type pump mounted on a steel baseplate and driven by vee ropes from a 2-h.p. induction motor. This motor is operated from an automatic control panel which is, in turn, controlled by a float switch unit fitted in the reinforced concrete reservoir. The plant is, therefore, quite automatic, since, if water is drawn from the reservoir, the float falls, causing the pump to start, and when the reservoir is filled the pump stops. The pump has an output of 1,200 gal. per hr., and the water provided is used for the swimming pool, café, bowling greens and tennis courts. The wiring for power and lighting has been carried out in screwed steel G.E.C. "Silverlac" conduit with G.E.C. vulcanised india-rubber insulated cables and switches of the iron-clad protected type are used throughout. The lighting fittings are of the totally enclosed pattern, fitted with white opal glassware and "Osram" lamps.



A Lister deep well pump at Stroud swimming pool

A Railway Year Book

The 1938-39 edition of the "Universal Directory of Railway Officials and Railway Year Book" which has just been published (Directory Publishing Co., Ltd., 33, Tothill Street, Westminster, S.W.1, 20s. net), includes most of the useful features of previous editions. In the new edition opportunity has been taken to include a chronological list of outstanding events in railway history. The increased development in the electrification of main line railways has necessitated the revision of tabular information on this subject, and the world's total mileage section has been completely overhauled and amended. Reference to the various sections is facilitated by an index to countries, a general index, and a personal index of railway officials. The lists of railway officials have been brought up to date, together with brief description of the chief railway governmental and other authorities exercising control over railways.

C.I.G.R.E. Proceedings

The proceedings of the 1937 meeting of the Conférence Internationale des Grand Réseaux Electriques a Haute Tension (54, Avenue Marceau, Paris) have now been published. They are contained in three volumes of 3,000 pages in all, with 863 illustrations, and cost 450 francs (375 francs to permanent members). The complete text of the 119 papers is given, together with a shorthand record of the discussions. Volume 1 deals with generation, transformation and circuit breaking, including metering and control, insulating materials; Volume 2 with the construction, insulation and maintenance of overhead and underground networks; while Volume 3 covers the operation, protection and interconnection of networks, including telephone and radio interference and safety questions.

Marconi's Yacht as a Radio Museum

According to the *Telegraph and Telephone Age* the Italian Government is to convert the late Senator Marconi's yacht *L'Elettra* into a floating radio museum.

E.A.W. Activities

Of the ninety candidates who entered the summer examination for the Electrical Association for Women's demonstrators' certificate held at fourteen centres throughout the country, seventy-five qualified, ten obtaining distinction. Fifty-six passes (six with distinction) were obtained by the seventy-nine candidates who sat for the teachers' examination. There are now 592 demonstrators' and 474 teachers' certificates held. On and after July 1st, 1942, £2 2s. will be charged for the E.A.W. diploma tests which certificate holders applying for the diploma at present take without additional fee. This fee will be payable by all applicants for the diploma.

A branch of the Electrical Association for Women has been formed at Nottingham.

Appointments Vacant

Meter inspector and tester for Hammersmith Electricity Department.

Draughtsman for the Ayrshire Electricity Board.

Senior demonstrator for the Coventry Electricity Department.

Meter tester for Burton-on-Trent Electricity Department.

Two technical officers and one assistant (Grade III) for the Air Ministry.

Meter superintendent and junior engineer for Hastings Electricity Department.

Salesmen, demonstrator and female attendant for Watford electricity showrooms.

(See our advertisement pages to-day.)

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

THERMAT heating pad.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Dr. James E. Myers, assistant to the Vice-Chancellor and senior lecturer and tutor to the Faculty of Science, Manchester University, is to succeed **Dr. B. Mouat-Jones** as principal of the Manchester College of Technology. Dr. Mouat-Jones was recently appointed Vice-Chancellor of Leeds University.

Mr. E. W. Evans, junior charge hand at Swansea has been appointed electrical maintenance engineer at the Tir John power station to fill a vacancy created by the resignation of Mr. **Kirby.** The post carries a commencing salary of £347 a year.

Mr. F. W. Ogilvie, President and Vice-Chancellor of the Queen's University, Belfast, has accepted the invitation of the B.B.C. Board of Governors to succeed Sir John Reith as Director-General of the British Broadcasting Corporation. He will take up his duties on October 1st. Mr. Ogilvie has been President of the Queen's University since 1934. He was educated at Clifton College and Balliol College, Oxford. From 1920 to 1926 he was fellow and lecturer at Trinity College, Oxford, and from 1926 to 1934 he was Professor of Political Economy in the University of Edinburgh. He served from 1914 to 1919 in the 4th Bedfordshire Regiment, and was wounded.

[*Elliott & Fry*
Mr. F. W. Ogilvie

The Institution of Electrical Engineers announces that the committee of the Meter and Instrument Section for 1938-39 will be as follows:—Capt. B. S. Cohen (chairman), and Messrs. F. E. J. Ockenden (vice-chairman), H. Cobden Turner (immediate past-chairman), H. M. Barlow, L. C. Benton, J. W. Carter, A. Felton, J. L. Ferns, E. Grundy, C. W. Hughes, F. J. Lane, C. G. Mayo, E. H. Miller, W. Philips and A. E. Quenzer. The Transmission Section committee will consist of Messrs. S. R. Siviour (chairman), F. W. Purse (vice-chairman), J. L. Eve (immediate past-chairman), H. J. Allcock, C. F. Bolton, W. M. Booker, N. K. Bunn, N. Cresswell, P. K. Davis, H. W. Grimmitt, W. J. John, J. S. Pickles, P. E. Rycroft, T. R. Scott and H. Willott Taylor.

Mr. O. F. Francis, burgh electrical engineer, Kirkcaldy, is to retire in September.

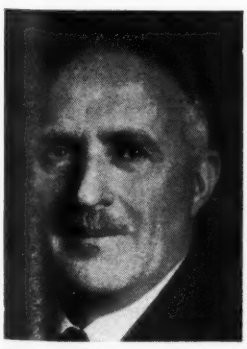
Mr. John M. Banks, superintendent of the machine shop of Babcock & Wilcox, Ltd., Renfrew, was recently presented by the staff with an inscribed gold watch on his retirement.

Mr. Stewart E. Arridge has been appointed general sales manager of the Lightfoot Refrigeration Co., Ltd., in succession to **Mr. V. Alex. Mattick.**

Mr. G. Hurford asks us to state that he has been appointed assistant manufacturing supervisor of the International Standard Electric Corporation and not the International Telephone and Telegraph Corporation as reported in our last issue.

Mr. E. J. Grout, Grad.I.E.E, has been appointed mains assistant to the Hammersmith Borough Council Electricity Department. Mr. Grout is at present with the Bromley Corporation Electricity Department, having previously been with the Epsom and Ewell Electricity Department, where he served his apprenticeship.

Mr. B. Handley, city electrical engineer and manager of the Portsmouth Electricity Department, which (as reported on page 117) yesterday put into service a new 30,000-kW generator and boiler plant, was appointed to his present position early in 1920, having been chief assistant engineer of the undertaking since 1903. Born in 1877, son of a civil engineer, Mr. Handley was educated at the Battersea Grammar School, receiving his technical training at the Finsbury Technical College. Before going to Portsmouth he held posts as assistant engineer at the Taunton, Wakefield and Worcester electricity works.



Mr. B. Handley

Councillor J. L. Rees, chairman of the Pontardawe Rural Council Electricity Committee for the past three years, has been elected vice-chairman of the South Wales and Monmouthshire Bulk Supply (Electricity) Association.

Lord Henley has been elected chairman of the Northampton Electric Light and Power Co., Ltd., in succession to the late Mr. R. E. Lamb.

Mr. J. L. Brook, the younger son of the managing director of Brook Motors, Ltd., has been appointed a director of the company. Mr. J. L. Brook was educated at Elmfield College, York, and received his technical training at the local Technical College and in the workshops at the company's Empress Works. He gained one of the silver medals offered by the Engineers' Training Association in 1929 and again in 1930, and in 1931 received the only gold medal in competition with 598 other students. He became a Grad.I.E.E. in 1932. At the Empress Works he has charge of advertising and also assists in electrical development, particularly the design of control gear for a.c. motors.

Mr. J. L. Brook

Mr. Gosta Malm, for twelve years director-general and chairman of the Royal Swedish Waterfalls Board, retired on July 1st. His place has been taken by **Mr. Waldemar Borgquist.**

Obituary

Mr. A. Joseph.—The death occurred on July 12th, at the age of fifty-four, of Mr. Adolf Joseph, of the United Insulator Co., Ltd.

M. Réné Thury, who was well known for his work in connection with the high-voltage transmission of d.c., died recently in Geneva. He had been an honorary member of the French Société des Electriciens since 1910.

Mr. E. A. Smith.—The death occurred in London on July 10th of Mr. Eustace Abel Smith, chairman of the Mid-Lincolnshire Electric Supply Co. He was seventy-five.

Col. Sir J. W. Pringle, C.B., Chief Inspecting Officer of Railways under the Ministry of Transport from 1916 to 1929, died last Saturday at Weydown, Cuckfield, aged seventy-five.

Mr. S. Insull.—The death in Paris on Saturday last of Mr. Samuel Insull recalls the international excitement which he caused in 1932 when he fled from the United States to avoid a trial on a number of charges. His career was a remarkable one. Born in London in 1859 he became associated with Edison's London agent, and when the inventor visited this country in 1881 he took Insull back to the United States with him as his secretary. Insull's work was the practical development and exploitation of Edison's patents, and he built up a rapidly expanding business which in 1892 was formed into the Edison General Electric Co., of which Insull became a vice-president. Later his main activities were in the electricity supply field; he became president of the Chicago Edison Co. and the Commonwealth Electric Co. (later the Commonwealth Edison Co.) in 1892. Under his guidance the company embraced gas and water supply and transport businesses over a wide area, and by 1930 the undertaking had become of a colossal size. The financial edifice which Insull had erected, however, was not proof against the shocks of the serious American slump of 1930 and onwards. The nominal values of the companies' assets depreciated in an alarming manner, and the shareholders pinned the blame on Insull. Charges of grand larceny were brought against him and his brother Martin, and warrants were issued against them. Samuel Insull left America and finally arrived in Greece, a country which had no extradition treaty with the United States. He was eventually asked to leave by the Greek Government, and he surrendered to the American authorities, but after greatly protracted legal proceedings was acquitted. Thereafter he took no active part in the utility business, but was restored to the pension rolls of some of his companies in 1935. In 1936 he became chairman of the Affiliated Broadcasting Co., which operates radio stations in the Middle West States. Insull was a member of the Institution of Electrical Engineers. He was one of the principal witnesses before the Weir Committee whose report resulted in the 1926 Electricity (Supply) Act. He was also a benefactor of the Temperance Hospital, Hampstead Road, London, and he contributed to the building fund of the Royal Institution. He leaves a widow and a son.

The late Mr. S. Insull

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares.

New Companies Registered

Henry Walker (Refrigeration), Ltd.—Private company. Registered July 13th. Nominal capital, £10,000. Objects: To acquire that department of the business of Henry Walker & Son, Ltd., of 55, Westgate Road, Newcastle-on-Tyne, which is concerned with the manufacture of refrigeration products, spare parts for refrigeration and apparatus, plant and other refrigeration appliances, &c. The permanent directors are: H. Walker, 18, Osborne Road, Newcastle-upon-Tyne; H. H. McEwan, 56, Fern Avenue, Newcastle-upon-Tyne; J. P. Ward and J. E. P. Crichton, addresses not stated. Registered office: 55, Westgate Road, Newcastle-upon-Tyne.

Vaduz Transmitter, Ltd.—Private company. Registered July 9th. Nominal capital, £25,125. Objects: To carry on business as agents or concessionaires in any part of the world for transmitting by wireless or wire radio programmes and matter of any kind, including television, photo-telegraphy and tele-cinematography, &c. The subscribers are: G. T. Mills, Offchurch House, near Leamington Spa; C. P. Hope, South Lodge, Cobham, Surrey. Solicitors: R. A. Rotherham & Co., 38, Bailey Lane, Coventry.

Smart's Radio, Ltd.—Private company. Registered July 9th. Capital, £100. Objects: To acquire the business of a wireless and electrical dealer carried on by Wm. Harris as Smart's Radio at Manor Park. Wm. Harris, 44, Preston Drive, Wanstead, E.11, is the first director. Secretary: W. J. Griggs. Registered office: 373, High St. North, Manor Park, E.12.

Robert W. Buckingham, Ltd.—Private company. Registered July 9th. Capital, £3,000. Objects: To carry on the business of manufacturers, importers, exporters and distributors of and dealers in lighting and heating specialities and appliances, &c. The directors are: R. W. Buckingham and Mrs. M. H. Buckingham, both of Winsleys House, Colchester. Registered office: 3, Holborn Place, W.C.1.

Auto-Batteries (Cleveland), Ltd.—Private company. Registered July 13th. Capital, £1,500. Objects: To carry on the business of electrical engineers and garage proprietors, &c. The directors are: T. W. L. Hanson, 34, Eastbourne Road, Linthorpe, Middlesbrough, and two others. Registered office: 90, Borough Road, Middlesbrough.

Astor Heating Co., Ltd.—Private company. Registered July 11th. Capital, £500. Objects: To carry on the business of heating, ventilating and hydraulic engineers, fire protection experts and advisers, electrical engineers, and general electrical installation contractors, &c. The directors are: P. Vickars, 7, Braeside Avenue, Patcham, Brighton; and C. Wenham, 66, Barnett Road, Brighton.

F. B. H. Durachrome, Ltd.—Private company. Registered July 11th. Capital, £3,000. Objects: To carry on the business of hard chrome depositors, electro-platers, electricians, electrical and mechanical engineers, &c. The directors are: E. C. Finding, 62, Blakesley Road, South Yardley, Birmingham, 25; W. H. Ball, 43, Mansfield Road, South Yardley, Birmingham, 25; and S. G. Howard Westbourne, Beach Hill Road, Wylde Green, Warwickshire. Registered office: 126, Factory Centre, King's Norton, Birmingham, 10.

Bourne Radio and Electric, Ltd.—Private company. Registered July 11th. Capital, £1,000. Objects: To carry on the business of wholesale and retail buyers, sellers, manufacturers, exporters and importers of and dealers in radio, television, electrical, scientific, telephone, telegraph, and X-ray apparatus, &c. The directors are: R. R. Day (permanent managing director and chairman), "Canford," Haywards Road, Parkstone, Dorset; and F. A. Fry, "St. Helens," Dorchester Road, Poole, Dorset. Registered office: 43a, Poole Road, Bournemouth West, Hants.

Chappuis Reflectors, Ltd.—Private company. Registered July 7th. Capital, £2,000. Objects: To carry on the business of manufacturers of all forms of daylight and artificial light reflectors and refractors, electrical fittings and signs of all kinds, &c. The directors are: W. C. Wise (chairman and permanent governing director) and B. Wise, both of 19, Manor Road North, Esher. Secretary: W. C. Wise. Registered office: 24, Stamford Street, S.E.1.

Stylesigns Manufacturing Co., Ltd.—Private company. Registered July 13th. Capital, £1,000. Objects: To acquire the business of sign manufacturers carried on by R. O. Girdlestone and H. J. Styles at Half Moon Street, Sherborne, Dorset, as "Stylesigns," and to carry on the business of inventors, designers and manufacturers of and dealers in electric, magnetic, scintillating and other signs, electrical, mechanical and general engineers, &c. The first directors are: R. O. Girdlestone, 4, Greenhill Court, Sherborne; H. J. Styles, Church Avenue, Sherborne; and F. G. Dimmock and Egbert E. Shellard, addresses not stated. Secretary: T. S. Bartlett, Greenhill, Sherborne, Dorset.

Collingwoods Distributors, Ltd.—Private company. Registered July 13th. Capital, £100. Objects: To carry on the business of manufacturers of and dealers in all kinds of electrical goods, precision instruments, &c. The directors are: I. H. Solomons, 151, Anson Road, N.W.2; and L. Rosen, 8, Atherton Road, E.7. Registered office: 83, Cannon Street, E.C.4.

Lawson Beck, Ltd.—Private company. Registered July 12th. Capital, £1,000. Objects: To carry on the business of manufacturing electrical engineers, electricians, contractors and manufacturers, &c. The permanent directors are: C. S. Lawson, Epworth House, Station Road, Birtley, Co. Durham, and A. J. A. Beck, Claremont, Swansfield Park Road, Alnwick, Northumberland. Registered office: Queensway, Team Valley Trading Estate, Gateshead-on-Tyne, 11.

Returns of Electrical Companies

Telephone and General Trust, Ltd.—Particulars have been filed of debenture stock to secure £400,000 and further stock issued from time to time, but not exceeding (together with the nominal amount of debenture stock outstanding under a trust deed dated November 3rd, 1937) the amount of the share capital for the time being issued, plus the amount of reserves as shown in the last audited balance sheet. The present issue was authorised May 3rd, 1938, and is covered by trust deed dated June 30th, 1938 (supplemental to the original deed). Property charged: The company's undertaking and property, present and future, including uncalled capital. The whole amount is now issued, and ranks *pari passu* with the original £400,000 stock. Trustees: Midland Bank Executor & Trustee Co., Ltd.

Petbow, Ltd.—Third debenture dated June 30th, 1938, to secure sums not exceeding £2,000, charged on the company's undertaking and property, present and future, including uncalled capital, ranking *pari passu* with a second debenture issued November 15th, 1937, as a second charge to a debenture issued September 13th, 1937. Holder: D. L. Sidney, 66, Arthur Court, W.2.

Artic Fuse & Electrical Manufacturing Co., Ltd.—Capital, £5,000 in 4,700 ordinary and 100 deferred ordinary shares of £1 and 4,000 founders' shares of 1s. Return dated December 31st, 1937 (filed April 9th, 1938). 2,683 ordinary, 100 deferred ordinary and 2,183 founders' shares taken up. £2,079 13s. paid on 1,983 ordinary and 1,933 founders' shares. £812 10s. considered as paid on 700 ordinary, 100 deferred ordinary and 250 founders' shares. Mortgages and charges, nil.

Gambrell Radio Communications, Ltd.—Satisfaction in full on November 28th, 1936, of debenture dated December 10th, 1935, and registered December 20th, 1935. (Notice filed July 6th, 1938.) (According to the register of mortgages, the debenture registered December 20th, 1935, originally secured all moneys due to bank.)

Newman Industries, Ltd.—The nominal capital has been increased by the addition of £120,000 beyond the registered capital of £90,000. The additional capital is divided into 100,000 6 per cent. redeemable preference shares of £1 and 200,000 ordinary shares of 2s. each.

British Insulated Cables (S.A.), Ltd.—Capital, £2,000 in £1 shares. Return dated February 24th, 1938. All shares taken up. £2,000 paid. Mortgages and charges, nil.

Baker & Hyman, Ltd.—Capital, £2,000 in £1 shares. Return dated Say 3rd, 1938. All shares taken up. £15 paid. £1,985 considered as paid. Mortgages and charges, nil.

Watmough (Wakefield), Ltd.—H. Derwick, incorporated accountant, 9, East Parade, Leeds, was appointed receiver and manager on July 9th under powers contained in debenture dated March 10th.

Chasetown and District Electricity Co., Ltd.—Capital, £100,000 in £1 shares. Return dated April 13th, 1938. 63,130 shares taken up. £1,000 paid. £62,130 considered as paid. Mortgages and charges, nil.

Electrically Welded Products, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1937 (filed May 7th, 1938). Two shares taken up. £2 paid. Mortgages and charges nil.

Grimston Electric Tools, Ltd.—Capital, £7,500 in £1 shares. Return dated April 25th. All shares taken up. £3,975 15s. paid (£1 per share on 2,801 and 5s. per share on 4,699 shares). Mortgages and charges: £3,500.

Electrical Facilities, Ltd.—Capital, £350,000 in £1 shares. Return dated April 27th. 291,667 shares taken up. £303,125 7s. 6d. paid (including £11,458 7s. 6d. on 91,667 shares). Mortgages and charges nil.

City Notes

Petters, Ltd.—Over 90 per cent. of the share capital of the Liverpool Refrigeration & Engineering Co., Ltd., which produces large refrigeration units for ships and industrial purposes, has been acquired by the company. This was announced at the company's annual general meeting last Friday by Mr. A. P. Good, the chairman, who stated that the acquired undertaking used manufacturing methods in many ways similar to those employed in the manufacture of oil engines and did not compete with Petters' oil engine customers. The acquisition would broaden the basis of their manufacturing activities. Regarding Petters' trade in general, the chairman said that in spite of many difficulties, particularly in the export trade, they had maintained their turnover during the year and they were able to present a better result from the point of view of profit. This was only the beginning of what he hoped was a definite step towards increased prosperity. In the latest "Superscavenge" Diesel engine the company had produced an engine far ahead of anything on the market at present, both with regard to performance and economy. A new range of small air-cooled engines of 1½ to 16 h.p., running on either petrol or paraffin, had a wide field of application.

The Palestine Electric Corporation, Ltd.—Notwithstanding the continued unrest in Palestine and the accompanying economic depression, the past year has been one of steady development for the company. Speaking at the ordinary general meeting on Tuesday, Viscount Samuel stated that during the year the number of consumers had increased by 14 per cent. compared with the previous year and the sales of electricity by 8.8 per cent. That the increase in revenue (from £582,765 to £611,051) was less proportionately than the increase in sales

was due mainly to further reductions in rates. Actually, in the past six years the average charges for electricity had been reduced by nearly a half. The new power house near Tel-Aviv has now been completed and will be put into commission shortly. Rapid progress, too, has been made with the extension of the Haifa power house plant. The first six months of the current year again show an increase on the corresponding period of last year in sales and gross revenue, although the rate of increase is less.

Aron Electricity Meter, Ltd.—Speaking at the annual general meeting on Monday Mr. Harry Kahn, chairman, stated that although the turnover of the London factory had been a record one, trading profits had not been commensurate with the increased volume of business. This was due to higher production costs owing to increased wages, the dislocation caused by building and plant extensions, and also the additional expense incurred by the requirements of the new Meters Act. On the other hand, the selling price of meters had been increased, but, owing to contracts already accepted, had been effective during only part of the year. The Austrian company had shown a small profit for the first time for years. The turnover of Aron for the first quarter of the current year was slightly lower than in the corresponding quarter last year, but the chairman saw no reason why the company should not show equally favourable results for 1938-39.

Thomas de la Rue & Co., Ltd., held their annual meeting on July 13th when Mr. S. S. Lamert (chairman), who presided, said that their plastic moulding business had shown healthy expansion and that it was a field which opened up great possibilities. Hitherto the moulding side of their business had contributed very little to their distributable revenue, for the reason that, year by year, it had absorbed large amounts of capital, until to-day instead of being a department, it had become practically a business of its own. While they would have to continue to make capital expenditure, the time was coming when the profits from the plastic moulding side of the business should contribute to their net revenue. The outlook for the moulding business appeared particularly bright at the moment, and they were breaking into new trades which seemed to offer unlimited prospects of increase.

Ward & Goldstone, Ltd.—Presiding at the annual meeting held on July 14th, Mr. M. H. Goldstone said that during the year under review their output and turnover were substantially in excess of previous years. At the conclusion of the year their new plant for the production of rubber compounds came into operation, with new laboratories, testing and research departments which enabled them to undertake important contracts to meet the requirements of Government departments and public authorities. The technical staff was ever alert in the creation of new lines, and they had many introductions to make during the current year from which they anticipated favourable results. At an extraordinary meeting which followed the annual meeting a resolution was passed converting the shares into stock.

Richardsons, Westgarth & Co., Ltd., report a profit of £25,469 for the fifteen months to March 31st last, as against a loss of £26,909 for the previous twelve months. The accounts take into consideration the whole of the alterations in capital and the consequent writing down of assets as comprised in the scheme of arrangement, and amalgamation with North-Eastern Engineering and George Clark (1936), Ltd., sanctioned on March 8th. From the profit is deducted £9,322 bank interest, £1,375 debenture interest and £1,500 directors' fees. After allowing for the debit balance of £7,861 brought forward, as approved under the capital reorganisation scheme, a credit balance of £5,412 is carried forward. During the year the value of work turned out by the combined companies was £1,500,000 and the value of the order book at present amounts to £1,533,136, most of which is due for delivery during the current financial year.

Ultra Electric (Holdings), Ltd., announces a loss of £859 for the year ended June 30th, as compared with a profit of £19,044 for the period July 17th, 1936, to June 30th, 1937. No dividend is to be paid (for the previous period 12½ per cent. was paid) and, deducting £258 brought in, a debit of £601 remains. The subsidiary, Ultra Electric, Ltd., shows a net loss of £39,896 (against a profit of £40,067) and a debit of £25,307 is carried forward. The loss is attributed mainly to the falling off in the demand for radio apparatus and to substantial reductions in prices of sets.

Thorn Electrical Industries, Ltd.—The combined profit of the company and its subsidiaries for the year ended March 31st last amounted to £55,640, which compares with £49,259 in the preceding year. After deducting salaries of executive directors £5,750 (same), director's fee £250 (£84), provision for additional management remuneration £884 (£380), income-tax and N.D.C. £17,219 (£11,054), the net profit is £31,537 (£31,490). A dividend of 20 per cent. (same) is to be paid and £11,350 (£12,500) is to be transferred to general reserve, leaving £8,533 (£5,080) to be carried forward. Meeting: July 27th.

Callender's Cable & Construction Co., Ltd., and Crompton Parkinson, Ltd., are negotiating for a closer working arrangement, while maintaining their respective individualities. The basis at present under discussion is the formation of a holding company which would make an offer to the members of both companies for the exchange of their stock or shares for stock in the holding company, leaving the two companies intact. A further announcement will be made of the result of the negotiations in due course.

The Nigerian Electricity Supply Corporation, Ltd., reports that the net profit for the year ended February 28th, at £83,124, shows an increase of £21,858 as compared with the previous year. Debenture redemption accounts for £7,861 (£7,416) and income-tax for £17,000 (£8,000), there being a loss of £2,685 on sale of investments. A final dividend of 4 per cent. is to be paid on the preferred ordinary shares, making 7 per cent., less tax, for the year (same) and a sum of £25,000 (£20,000) is placed to preferred ordinary share reserve, leaving £6,193 (£2,971) to be carried forward. Work in connection with the harnessing of the Jekko Falls has proceeded satisfactorily during the year, and it is anticipated that the new power station will be in operation next September.

W. & T. Avery, Ltd., report a net profit of £161,354 for the year ended March 31st as compared with £166,645 for the preceding year. After allocating £41,392 (£32,550) to depreciation and bringing in £65,080 (£62,392) there is, when dividends paid have been provided for, a balance of £182,611 (£184,355) available. A final dividend of 10 per cent. is to be paid, making 15 per cent. for the year (same), and sums of £45,000 and £10,000 (same) are to be placed respectively to general reserve and pensions fund reserve, leaving £65,149 to be carried forward. Meeting: July 26th.

Hall Telephone Accessories (1928), Ltd., state in an interim report that, on current results and on a forecast based on the last six months of the company's financial year, they feel justified in maintaining the interim dividend of 5 per cent. The company has received increases in orders both from Government departments and private customers and the main factory at Willesden has been fully employed.

Crossley Bros., Ltd.—Net profits for the year ended April 30th last, at £62,839, showed an increase of £17,386, compared with those for 1936-37. A sum of £15,000 goes to depreciation reserve, £10,000 (£11,000) to reserve for foreign debts, and £5,000 (nil) to general reserve. After dividend payment, £29,984 (£27,686) is carried forward.

Crossley Premier Engines, Ltd. (controlled by Crossley Bros., Ltd.), show a net profit of £43,311 for the year ended April 30th, against £42,685 for 1936-37. General reserve will receive £7,500 (same), depreciation reserve £7,500 (same) and staff pension fund £750 (£1,300). The carry forward is increased from £5,924 to £6,429.

Bennis Combustion, Ltd., reports a net profit of £24,907 for the year ended April 30th, as compared with £22,386 in 1936-37. After allocating £3,500 (£908) to income tax and N.D.C., £6,000 (£4,000) to general reserve and £1,500 to reserve for contracts subject to retention, a final dividend of 5 per cent. is to be paid, making 10 per cent. (same), leaving £3,376 (£2,970) to be carried forward.

The London Electrical & General Trust, Ltd.—The net revenue for the year ended June 30th was £35,049, compared with £28,789 for the previous year. A sum of £5,000 (same) is placed to reserve and £12,845 (£14,897) is carried forward. Meeting: July 25th.

Companies to be Struck off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary:—Arthur for Wireless, Ltd.; Botolph Radio, Ltd.; Cam Electrical, Ltd.; Home Electric, Ltd.; Radia Electric Co. (Gloucester), Ltd.

The Quebec Power Co., Ltd., reports a gross revenue of $2,050,483 for the six months ended June 30th, against $1,938,429 for the corresponding period of 1937. The surplus, before allowing for depreciation and income-tax, is $583,993 ($483,867). A quarterly dividend of 25 cents per share is to be paid.

H. J. Baldwin & Co., Ltd., report a profit for the year ended March 31st of £13,400, as compared with £10,141 in the preceding year. It is proposed to pay a dividend of 10 per cent. on the ordinary shares for the year and to carry forward £3,507.

London Associated Electricity Undertakings, Ltd., have declared an interim dividend of 3 per cent., less tax, on the ordinary stock (same).

The Metropolitan Electric Supply Co., Ltd., is to pay an interim dividend of 3 per cent. (same).

John Ismay & Sons, Ltd., are maintaining the dividend on the ordinary shares at 45 per cent.

Stocks and Shares

TUESDAY EVENING.

STOCK Exchange markets have entered upon the three weeks' account which includes the August Bank Holiday and which is considered as being the real start of the holiday season. Up to the present, business in stocks and shares has disregarded holiday influences. The general state of markets is by no means stagnant or inanimate.

New issues are making their appearance nearly every day. Possibly the sponsors wish to float as many of these issues as they can conveniently do before August. The response of the public to the majority of these offers has been so far fairly favourable, and confirms the impression that capital is still glad to have the opportunity for employment, even at a meagre rate of yield, provided the security is sound and that the price at which it is offered does not carry any great risk of depreciation.

Cables Stocks and Shares

Cable and Wireless ordinary stock found difficulty in maintaining its previous level of 54, and, on a comparatively small amount of selling, the price reacted to 52½. The preference, at 97½, shows a decline of half a point, the reaction being due, not so much to any fear of decline in the next index figure, as a somewhat natural fall after the recent rises in the three classes of stock. The income stock is unchanged at 101.

Globe Telegraph and Trust ordinary at 15½ have lost ¼ on their last week's advance. American Telephone and Telegraph keeps closely to the neighbourhood of 142. Marconi Marines have gone ahead from 26s. 3d. to 27s. 6d., and Great Northerns at 38 are 10s. up

Callender's and Cromptons

An outline of the proposed agreement between Callender's Cable and Crompton Parkinson was published on Monday of

this week. Negotiations are proceeding for the formation of a holding company which would make an offer to the proprietors of both companies for the exchange of their stock and shares for stock in the holding company, leaving the two companies intact. On rumours of some such scheme being in the offing, prices of both the ordinary shares concerned had risen by half a crown during the week preceding the announcement. Immediately after the statement became known, Crompton Parkinsons rose from 30s. to 32s. 6d., but fell back later to the former figure. Callenders scored and retained an improvement of 7s. 6d., to 5⅛. The strength of the two quotations speaks for the market's estimate of the advantages likely to accrue from the linking up of these leaders in the electrical equipment field.

Electricity Supply

Electricity supply shares are distinguished only by a few advances in the ordinary shares of the provincial companies. In the London list last week's improvements are retained by County of London and Metropolitan. This week, Edmundsons ordinary at 27s. 6d., Midland Counties and Scottish Power, both at 38s., and Yorkshire at 41s., are all 6d. higher.

It will be noticed that the yield on the ordinary shares of the electricity supply companies now comes to little more than 4¼ per cent. on the money. This is a modest return, but one which the investor is nevertheless prepared to accept, in view of the strength of these particular companies and the possibility of dividend expansion. So far as the London companies are concerned, it is thought that the companies have probably reached the full extent of the dividends they are likely to declare, but with the provincial undertakings there has to be taken into account, besides the dividends, the prospect of future new issues which, if made, would be offered at bonus prices; at prices, that is to say, sufficiently lower than the prevailing quotations in the market for the difference to constitute a profit to the allottees of new shares.

Victoria Falls have further improved upon their rises of the past fortnight, and at 71s. 3d. show a gain of 1/6 on the week. Mexican Light and Power first bonds, after their spurt, have come back a little to 27½.

Dealings opened at ½ discount in the new Midland Counties Electric 3½ per cent. debenture stock, issued last week at par.

Preference Shares in Demand

Fashions change in the financial world in the same way that they do in that of feminine frippery, and it is of interest to notice that high priced preferences shares, standing well above their nominal values and giving an almost gilt-edged yield at current values, are again coming into demand. Some few months ago the tendency set decidedly in the other direction; it became difficult to sell, for example, 6 per cent. preference shares at anything like 30s., showing a yield of 4 per cent. on the money. To-day the investor is on the look-out for shares of this nature, and in a lengthy list of shares wanted to purchase by a leading Stock Exchange firm of dealers, particulars of shares are included which, standing at substantial premiums, give a return of 4 per cent. or a little over. Instead of its being difficult to find a home for such shares, to-day's disposition is for the seller to get on, in Stock Exchange phrase, more easily than the buyer.

Of the famine in good class electrical debenture stocks, mention has been made on many occasions, and to-day the same conditions continue.

Manufacturing and Equipment

Having followed for some way, but in more sedate fashion, the upswing in Wall Street prices, the Home industrial markets appear unwilling to go further in the advance for the time being. In most cases, however, the gains have been well consolidated; prices are not inclined to fall away in company with the volume of business. In the market for electrical equipment shares, British Insulated are ½ down, at 4⅛, but other declines, such as have taken place in General Electrics, Ericssons, and Ever Ready, are of trifling consequence. Telegraph Construction, at £2 ex-dividend, have shed a few pence in addition to the deduction of the dividend. The 5s. ordinary shares of Thorn Electrical Industries, which report an increase in the year's profits, are quoted at 10s. 9d. ex-dividend, to yield over 9 per cent. on the recently declared 20 per cent. dividend.

Nigerian Electricity

The report issued by the Nigerian Electricity Supply Company evidently reflects a year of activity among the undertaking's largest customers—the Nigerian tin mining concerns—and the enlargement of plant and capacity to meet their growing demands for electric power and light. Output is stated to have risen by a third, and profits to a slightly larger extent. Public interest in the company is active more in the 7½ per cent. preferred ordinary than in the 5s. ordinary shares. The two classes of shares halve any surplus of profits after the former have been paid the fixed 7½ per cent. Payments to preferred shareholders began with a 3 per cent. distribution in 1934; the full rate was attained last year, and is continued in the dividend just declared. A present price of 20s. 9d. for the shares recognises that the tin mines, now restricted to the production of less than half their standard output, must be less pressing in their requirements than they were during the company's last financial year.

Share List of Electrical Companies

	Nom.	Dividend. Previous.	Last.	Price July 19.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	66/3	+⅛	4 10 7
City of London	1	7½	7½	33/6	—	4 9 7
Clyde Valley	1	7	8	37/-	—	4 6 8
County of London	1	10½	10½	49/6	—	4 4 7
Edmundson's 7% Pref.	1	7	7	32/6	—	4 7 6
Do. Ord.	1	8	9	27/6	+6d.	—
Elec. Dis. Yorkshire	1	9	9	42/6xd.	+9d.	4 4 9
Elec. Fin. and Securities	1	12½	12½	50/-	—	5 0 0
Elec. Supply Corporation ...	1	11	12	53/9	—	4 9 5
Lancs Light and Power	1	7½	7½	32/-	—	4 13 9
Lond. Assoc. Electric	1	—	7	30/-xd.	+6d.	4 13 4
London Electric	1	8	7	35/6	—	3 19 0
London Power Deb. Red. ...	Stock	5	5	106½	—	4 14 0
Metropolitan	1	10	12	50/-	—	4 16 0
Midland Counties	1	7½	8	38/-	+6d.	4 4 3
Mid. Elec. Power	1	8	9	40/9	—	4 8 3
North Eastern Electric Ordinary	1	7	7	33/-	—	4 5 10
Do. 7% Pref.	1	7	7	33/-	—	4 5 10
Northampton	1	10	10	46/3	—	4 6 7
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary ...	1	10	10	48/9xd.	+6d.	4 2 0
Do. do. 6% Pref.	1	6	6	29/6	—	4 1 4
Scottish Power	1	8	8	38/-	+6d.	4 4 3
South London	1	7	7	32/-	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	18/9	—	8 0 0
Yorkshire Elec.	1	8	8	41/-	+6d.	3 18 1
PUBLIC BOARDS.						
Central Electricity, 1950–70 ...	Stock	5	5	115	+1	4 7 0
Do. 1955–75 ...	,,	5	5	116	—	4 6 2
Do. 1951–73 ...	,,	4½	4½	109	—	4 2 7
Do. 1963–93 ...	,,	—	3½	100	—	3 10 0
London Elec. Trans. Gtd.... ...	,,	—	2½	92	+1	2 14 4
London & Home Counties, 1955–75	,,	4½	4½	112½	—	4 0 0
London Passenger Transport, A...	,,	—	4½	118½	+1	3 16 0
Do. do. B...	,,	—	5	119½	+1	4 3 8
Do. do. C...	,,	4	4½	75½	−½	5 12 7
West Midlands Joint Elec. 1948–68	,,	—	5	112	—	4 9 3
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	142½	—	6 6 4
Anglo-Am. Tel. Pref.	Stock	6	6	108½	+½	5 10 7
Do. Def.	,,	1½	1½	26	—	5 15 5
Cable & Wireless 5½% Pref. ...	,,	4½	5½	97½	−½	5 12 10
Do. Ord.	,,	—	4	52½	−1½	7 12 5
Do. Income	,,	—	—	101	—	3 19 1
Globe Tel. & Tel. Ord. ...	10	5½*	7½*	15½	−⅛	4 16 9
Do. do. Pref. ...	10	6	6	13⅜	—	4 8 1
Great Northern Tel.	10	20	20	38	+½	5 5 3
Marconi-Marine	1	10	7½	27/6	+⅛	5 9 1
Oriental Telephone Ord.	1	12*	12*	58/9	—	4 1 8
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	6/3	—	—
Do. do. 2nd Pref.	5	Nil	Nil	5/-	+⅛	—
Do. do. 5% Deb.	Stock	Nil	Nil	13	—	—
British Electric Traction Def. Ord.	,,	5	5	1025	—	—
Do. do. Pref. Ord.	,,	8	8	170	+5	4 14 2
Brazil Traction	$100	70 cts.	$1	13	+½	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	100	—	5 0 0
Mexican Light Common	$100	Nil	Nil	1	—	—
Do. do. 1st Bonds	$500	5	5	27½	−2½	—
Victoria Falls Ord.	1	12	13½	71/3	+⅛	3 15 9
West Riding	1	6½	10	35/-	—	—
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	1⅛	—	9 4 8
Assoc. Elec. Ord.	1	10	10	39/-	—	5 2 7
Do. Pref....	1	8	8	36/6	—	4 7 6
Babcock & Wilcox	1	10	10	40/-	—	5 0 0
British Aluminium Ord.	1	10	12½	52/6	—	4 15 4
British Insulated Ord.	Stock	20	20	4⅛	−⅛	4 6 6
Brush Ord....	,,	Nil	Nil	26½	—	—
Callenders'...	1	20	20	5⅛	+⅛	3 18 0
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord. ...	5/-	12½	12½	30/-	—	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	10	12½	32/6	—	7 13 10
Enfield Cable Ord.	1	25	25	2½	—	—
English Electric	1	Nil	10	31/-	—	6 9 0
Do. do. Pref.	1	6½	6½	26/-	—	5 0 0
Ericsson Tel.	5/-	25	25	30/6	−1/9	3 3 3
Ever Ready	5/-	45	35	20/6	−3d.	8 10 8
Ferranti Pref.	1	7	7	27/6	—	5 2 0
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	17½	20	77/-	−6d.	5 4 0
Henley's	5/-	15	20	21/3	—	4 14 1
Do. 4½% Pref.	1	4½	4½	1⅛	—	4 4 8
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	10	12½	38/3	—	6 17 9
Lancashire Dynamo	1	20	25	3	+½	8 6 8
Siemens Ord.	1	7½	7½	25/-	—	6 0 0
Telegraph Construction	£1	7½	10	2xd.	−6d.	5 0 0

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1936

25084. "Electric remote transmission or repeating apparatus." Allgemeine Elektricitäts Ges. September 13th, 1935. (487457.)

25212. "Road control systems." Siemens & General Electric Railway Signal Co., Ltd., A. R. Carpenter, F. A. Downes and H. J. W. Riddle. September 16th, 1936. (487398.)

25416. "Electron-discharge devices." C. S. Bull. September 18th, 1936. (487674.)

25417. "Circuit arrangements employing electron-discharge devices." C. S. Bull. September 18th, 1936. (487768.)

25670. "Protective systems for electrical networks." H. Muth and K. Zimmermann. September 19th, 1935. (Cognate applications 25671/36 and 25672/36.) (487666.)

25895. "Static frequency changers." J. M. Schmierer. September 23rd, 1935. (487668.)

33276. "Junction box for electric cables and the like." W. A. Nelson. December 4th, 1936. (487775.)

34935. "Electron accelerating apparatus." O. Klemperer. December 19th, 1936. (487778.)

34957. "Electrodes for electric-discharge devices." British Thomson-Houston Co., Ltd. December 21st, 1935. (487779.)

35059. "Centrifugally controlled electric switches." Ransomes, Sims & Jefferies, Ltd., and B. S. Rogers. December 21st, 1936. (487781.)

35088. "Time switches for periodic absorption refrigerating apparatus." K. W. T. Van Heteren. December 21st, 1936. (487683.)

35098. "Television and like transmission systems." Fernseh Akt. Ges. December 23rd, 1935. (487501.)

35099. "Thermionic valve oscillation generators." Fernseh Akt. Ges. December 20th, 1935. (487502.)

35131. "Television transmitting apparatus." H. Miller and J. E. I. Cairns. December 22nd, 1936. (487833.)

35393. "Searchlights." Sperry Gyroscope Co., Ltd., and H. L. Thomas. December 24th, 1936. (487608.)

35515. "Electric switches and other like fittings used in electricity distributing systems." N. Allday and R. Bain. December 28th, 1936. (487690.)

1937

106. "Plug-and-socket fittings for electric circuits." United Electrical Co. (Coolex), Ltd., F. R. Prendergast and S. E. Sheerman. January 2nd, 1937. (487693.)

1069. "Electron multipliers." Farnsworth Television, Inc. February 11th, 1936. (487610.)

1382. "Methods of braking asynchronous electric motors." British Thomson-Houston Co., Ltd. January 17th, 1936. (487695.)

1843. "Electric traction and like control systems." W. T. Gray and Metropolitan Vickers Electrical Co., Ltd. January 21st, 1937. (Addition to 451514.) (487422.)

2146. "Apparatus for temporarily laying electric cables." I. T. Kempe. January 25th, 1937. (487513.)

2193. "Pole-mounted electric cartridge fuses." Electric Transmission, Ltd., and K. Dannenberg. January 25th, 1937. (487423.)

2256. "Electrical fuses of the rewirable type." J. A. Crabtree & Co., Ltd., H. F. McLoughlin and P. G. Harrison. January 26th, 1937. (Addition to 480887.) (487424.)

2682. "Lightning arrestors." A. E. O'dell (Electric Service Supplies Co.). January 29th, 1937. (487698.)

3493. "Thermionic electrodes for electric-discharge tubes." S. A. Abbott. February 5th, 1937. (Cognate application 15919/37.) (487699.)

4103. "Wireless receiving systems and the like." G. Hayes. February 11th, 1937. (487700.)

4261. "Prepayment mechanism for electric supply meters." English Electric Co., Ltd., G. Tilstone and J. F. Donelly. February 12th, 1937. (487432.)

5040. "Combinations of gas-filled electric-discharge devices and materials adapted to be excited to luminescence." General Electric Co., Ltd. (Patent Treuhand Ges. für Elektrische Glühlampen). February 19th, 1937. (487520.)

5394. "Electric circuit controllers." J. G. Smithson & Co., Ltd., and J. G. Smithson. February 23rd, 1937. (487437.)

6661. "Teleprinter exchange systems," E. E. Towler (Siemens & Halske Akt.-Ges.). March 6th, 1937. (487441.)

7021. "Electric switches of the tumbler type." R. Bain and N. Allday. March 10th, 1937. (487619.)

8116. "Aerial and feeder systems." Marconi's Wireless Telegraph Co., Ltd. April 28th, 1936. (487708.)

8199. "Antenna structures for wireless direction or course finding." C. Lorenz Akt.-Ges. March 21st, 1936. (487446.)

8294. "Braking devices for the tuning controls of radio receiving sets." Naamlooze Venootschap Philips' Gloeilampenfabrieken. March 23rd, 1936. (487447.)

9099. "Link or fuse boxes for electrical distribution systems." Pirelli-General Cable Works, Ltd., and F. R. Tatchell. March 31st, 1937. (487449.)

10028. "Wireless receiving apparatus." General Electric Co., Ltd., and F. H. Britain. April 8th, 1937. (487451.)

10193. "Electrically controlled apparatus for producing alternating pressure in a cylinder with an operation period." Knorr-Bremse Akt.-Ges. April 30th, 1936. (487530.)

10409. "High-frequency electric cable and process of manufacturing the same." Finska Kabelfabrieken Aktiebolag. December 5th, 1936. (487622.)

11161. "Oil circuit-breakers." D. R. Davies, and Metropolitan-Vickers Electrical Co., Ltd. April 19th, 1937. (487452.)

12238. "Cubicles or compartments for containing alternating current electrical apparatus and having iron or steel walls or doors." General Electric Co., Ltd., C. A. Maer and W. Wilson. April 29th, 1937. (487625.)

12280. "Electric accumulators." Compagnie Générale d'Electricité. May 15th, 1936. (487715.)

12706. "Thermionic multi-grid valves." M-O Valve Co., Ltd., and W. H. Aldous. May 4th, 1937. (487627.)

12707. "Electrical circuits for frequency changing." General Electric Co., Ltd., and W. H. Aldous. May 4th, 1937. (487628.)

12709. "Radio directive systems." Standard Telephones & Cables, Ltd. June 5th, 1936. (487716.)

13510. "Electron image-amplifier and dissector." P. T. Farnsworth. May 13th, 1937. (487719.)

15019. "Suspension electric insulators." T. Powell and W. J. Powell. May 31st, 1937. (487456.)

15443. "Electric fuse for submarine mines, grenades, bombs and like ammunition." Soc. Anon. Fax. June 3rd, 1936. (Cognate application 15444/37.) (487544.)

16157. "Electric indicating systems for dirigible craft." J. Scherrer. June 11th, 1936. (487459.)

17227. "Electrical purification of gases." E. C. Saint-Jaques. June 21st, 1937. (487547.)

17482. "Electric-discharge devices." British Thomson-Houston Co., Ltd. June 23rd, 1936. (487460.)

19544. "Vapour electric-discharge devices." British Thomson-Houston Co., Ltd. July 16th, 1936. (487462a.)

20175. "Obtaining electric contact between two metallic parts abutting against each other." R. Bosch Akt.-Ges. July 21st, 1936. (487463.)

22237. "Electric immersion heaters." British Thomson-Houston Co., Ltd. August 12th, 1936. (487732.)

22290. "Valve circuit arrangements for automatic limitation of the duration of an electrical process." A. C. Gunstone and A. Nemet. August 13th, 1937. (487466.)

23162. "Thermal relays.' Akt. Ges. Brown Boverie & Cie. August 24th, 1936. (487735.)

23674. "Electric water heaters." Hume Pipe Co. (South Africa, Ltd.). September 3rd, 1936. (487559.)

24224. "Devices comprising high-pressure metal-vapour discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 7th, 1936. (487469.)

24290. "Television transmitter." Radioakt. Ges. D. S. Loewe. September 5th. 1936. (487560.)

25697. "Method for securing correctly phased reproduction of pictures and for removing liability to distortion in television and like apparatus." E. Michaelis. September 22nd, 1936. (487737.)

25737. "Circuit arrangements adapted to produce electric current impulses of predetermined duration." British Thomson-Houston Co., Ltd. September 25th. 1936. (487563.)

26839. "Electrical stabilising devices comprising a pendulum." Siemens Apparate und Maschinen Ges. October 12th, 1936. (487742.)

27266. "Devices for tilting high-frequency furnaces." Siemens & Halske Akt. Ges. March 24th, 1937. (487565.)

27356. "Ear-cap for telephone receivers or mouthpiece for microphones." N. P. R. Jarnack. October 5th. 1936. (487566.)

27377. "Reeling systems particularly applicable to the reeling of antenna wires in aircraft." Standard Telephones & Cables, Ltd. December 30th, 1936. (487568.)

27959. "Telegraph line circuits for teleprinter exchange systems." Standard Telephones & Cables, Ltd. October 14th, 1936. (487476.)

29234. "Variable condensers." Telefunken Ges. für Drahtlose Telegraphie. October 26th, 1936. (487650.)

29518. "Straight-through conductor type current transformer with insulation of ceramic material or pressed material such as synthetic resin." Allmänna Svenska Elektriska Aktiebolaget and B. Olsson. October 28th, 1937. (487651.)

30367. "Electrical plug-and-socket devices." Cinch Manufacturing Corporation. November 20th, 1936. (487746.)

32107. "Electric radiation hot plates." Siemens Schuckertwerke Akt. Ges. November 21st, 1936. (487750.)

33101. "Electric cables." Soc. Italiana Pirelli. December 19th. 1936. (487578.)

33723. "Electric switches operated by cams." British Thomson-Houston Co., Ltd. December 5th, 1936. (487658.)

33798. "Supports or carriers used in electro-plating baths, and protective coverings therefor.' F. A. Ketch and H. F. Ketch. December 7th, 1937. (487482.)

24055. "Devices for the water-tight connection of screened cables." R. Bosch Akt. Ges. December 11th, 1936. (487580.)

34204. "Couplings or connections for electric lampholders." W. E. Wade. December 10th. 1937. (487483.)

34276. "Electric fans." British Thomson-Houston Co., Ltd. December 10th, 1936. (487581.)

35047. "Directional antenna system." Standard Telephones & Cables, Ltd. December 31st, 1936. (487485.)

1938

1216. "Electric gas-blast switches." British Thomson-Houston Co., Ltd. January 13th. 1937. (487585.)

1506. "Manufacture of electric heating elements." Soc. d'Etudes et d'Applications Industrielles Soc. Anon. January 20th. 1937. (487662.)

2508. "Signal-receiving apparatus for telephone systems." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 29th, 1937. (487488.)

5174. "Thermal switches." Standard Telephones & Cables, Ltd. March 4th, 1937. (487827.)

5434. "Electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 23rd, 1937. (487762.)

7097. "Fusible elements for protecting electric circuits." British Thomson-Houston Co., Ltd. March 6th, 1937. (487829.)

7243. "Circuits for electric-discharge devices." British Thomson-Houston Co., Ltd. March 9th, 1937. (487592.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 13th:—

K. Monel. No. 585119. Class 5. Unwrought and partly wrought nickel alloys for use in manufactures and wire made of nickel alloys.—Henry Wiggin & Co., Ltd., Thames House, Millbank, Westminster, S.W.1.

Mipolam. No. 585926. Class 8. Insulated electric flexibles and cables.—F. A. Hughes & Co., Ltd., Abbey House, Baker Street, N.W.1.

Hecla. No. 584165. Class 13. Electric lamps (ordinary), electrodes of ordinary metal, vehicle headlamps, fusible electric cut-outs and reflectors of ordinary metal.—Kooperativa Forbundet Forening, U.P.A., Stockholm, Sweden. (British representatives, J. E. Evans, Jackson & Co., 57-60, Holborn Viaduct, E.C.1.)

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—School, Bridge of Don (£30,000); architect, Education Committee, Aberdeen.

Alcester.—Houses, Kingwarden Road and Watts Road; R.D.C. surveyor.

Alderley Edge.—Council offices, Trafford Road; U.D.C. surveyor.

Alnwick.—Houses (24), Warkworth; R.D.C. surveyor.

Barnstaple.—School, Vicarage Street; B. W. Oliver, architect, Barnstaple.

Bedford.—Houses, London Road and Goldington; Town Council. Development of Honey Hills estate; Quarry & Ashwell. Bus station, Broadway; Eastern National Bus Co., Ltd. Extensions to infants' school (£7,150); L. de Soissons, architect.

Bilston.—Health clinic; Lyons, Israel & Elsom, architects, 3, Paul's Bakehouse Court, London, E.C.4.

Birmingham.—Block of shops, Coventry Road, for S. I. King, Waterloo Street; Holdsworth & Sons, builders, Coventry Road.

Bexley.—Houses (94), Glenmore Road; borough engineer.

Blackpool.—Houses (30), Lockerby Avenue; R. & H. Fletcher, Ltd., Lyddesdale Avenue, Cleveleys. Shops, workshops, flats and garages, Preston New Road; Halstead Best, architect, 20, Clifton Street.

Bournemouth.—Shops, Muscliff Castle Lane; C. E. N. Borley.

Bradford.—School, Fairweather Green, for the E.C.

Brighton.—Houses (200), Allotments site; borough engineer. Gymnasium, Saunders recreation ground (£2,075); borough engineer. Clinic, Whitehawk estate (£5,668); Frank Palmer, Ltd. Factory, East Moulsecoomb (£5,250); Danish Bacon Co. School, Moulsecoomb estate (£10,334), for the E.C. Enlargement of St. Mary Magdalen school (£9,635); R.C. trustees.

Buckingham.—Houses (62), Tingewick estate; borough engineer.

Cambridge.—Health centre; borough surveyor.

Chatham.—Houses (42) and flats, Pagitt Street; borough engineer.

Cheltenham.—Hotel, Pittville Street; estate agents, Norfolk & Prior, Hay Hill, London, W.1.

Consett.—Council offices for the U.D.C.; surveyor.

Darlington.—Extensions to Beaumont school (£5,000); E. Minors, borough engineer.

Dartford.—Houses (65), East Hill House estate; P. C. Brazier, Estate Office, Burnham Road.

Denbighshire.—Enlargement to schools, Abergele and Ruabon, for the County E.C., Ruthin.

Derby.—School, Winchester Crescent (£13,830), for the E.C.

Derbyshire.—School, Littleover (£14,769), for the County E.C.

Dewsbury.—Houses (150), Canterbury Road; borough engineer.

Doncaster.—Additions to school, for the Yorkshire Institution for the Deaf; Walker & Thompson, architects, Carbon Chambers, Hallgate.

Douglas (I.O.M.).—Houses (162), Ballakermeen estate, for Ideal Homes, Ltd.

Dudley.—Flats (82), Pitfield Row; Webb & Gray, architects, High Street.

Eastcote.—Houses (134), Fore Street estate; W. Spencer, Ltd., Station Road, North Harrow.

Eire.—(DUN LAOGHAIRE).—Extensions to St. Michael's Hospital (£80,000), for Sisters of Mercy; T. & J. Macken, contractors, Patrick Street, Dun Laoghaire.

Fifeshire.—School, St. Andrews (£27,300), additions to St. Andrew's Burgh school (£9,000), and rebuilding of Viewforth school, Kirkcaldy, after fire (£13,410); architect, County Council, Kirkcaldy.

Gateshead.—Cinema, Bensham Road, for T. H. Smelt: Stephenson and Gillis, architects, 2, Saville Place, Newcastle-on-Tyne. Additions to garage, for Northern General Transport Co., Ltd. (£16,000); Gordon Durham and Co., builders, East Boldon.

Glasgow.—Houses (162), Holmfauldhead Drive, for Corporation; architect, Housing Department. Seven-storey block of flats, Great Western Road; Alex. Woolf (Builders and Contractors), Ltd., Gosforth, Newcastle-on-Tyne.

Gosforth (NEWCASTLE-ON-TYNE).—Houses (24), Mountfield Gardens; Cunningham and Foster, Kenton Lane.

Hanford.—Estate development, Primrose Hill; Stafford Coal & Iron Co.

Hawarden.—Houses, Saltbey and Sandycroft; R.D.C. surveyor.

Hebburn-on-Tyne.—Houses, Mill Lane and Crawley Avenue; W. Forster, Ltd., builders, Shields Road, Newcastle-on-Tyne.

Hemsworth.—Houses (100), South Elmsall; R.D.C. surveyor.

Hornchurch.—Houses (96), St. Andrews Avenue; R. Costain, Ltd.

Hove.—Alterations to the Town Hall, &c. (£62,500), for T.C.

Hull.—Six blocks of almshouses, Anlaby Road, for Hull Trinity House; F. J. Horth and H. Andrew, architects.

Ince-in-Makerfield.—Houses (82), Church Street; U.D.C. surveyor.

Irthlingborough (NORTHAMPTONSHIRE).—Houses (25), Addington Road, for the U.D.C.

Leicestershire.—School, Kegworth, for the County Council E.C.

Liverpool.—School, Lidderdale Road (£11,370), with electrical work; Brown & Backhouse, builders, 62, Chatham Road.

School, Smithy Lane, Speke (£64,000); Unit Construction Co., builders. School, Sparrow Hall estate (£22,144), with electrical work; Rimmer Bros., builders, Dalton Street.

London.—(DEPTFORD).—Extensions to Archangel works, Cold Blow Lane; Somerville-Barnard Construction Co., Ltd. (GREENWICH).—Maternity ward, St. Alfege's Hospital (£85,400); L.C.C. architect, County Hall, Westminster Bridge Road, S.E.1. (HOMERTON).—Nurses' home, Eastern Hospital (£114,230); L.C.C. architect. (PADDINGTON).—Dwellings, Chippenham Mews area; borough engineer. Shops and flats, Edgware Road and Church Street; T. P. Bennett & Sons, 43, Bloomsbury Square, W.C.1. (STEPNEY).—Tenements, Limehouse Fields area; borough engineer. (CLAPTON).—Enlargement of secondary school (£23,305); L.C.C. architect. (HACKNEY).—Enlargement of Ram's Episcopal Chapel schools; managers. (LEWISHAM).—Factory, Ashgrove Road; Wray, Ltd., Ashgrove Road, Bromley Hill, Kent. (PADDINGTON).—Enlargement of High school (£21,471); C. P. Roberts & Co., Ltd., 31, High Holborn, W.C.1. (POPLAR).—Extensions to School of Engineering (£7,650); L.C.C. architect. (ROTHERHITHE).—Rebuilding of Albion Street school; L.C.C. architect. (WESTMINSTER).—Extensions to technical institute (£61,125); L. H. & R. Roberts, 144, Lower Clapton Road, E.5.

Malton.—Houses; J. &. A. Grayshon. Extensions to Council offices; G. D. Channon, architect.

Manchester.—Block of 80 flats at Wilmslow Road, Didsbury, for M. B. Bloom; Marshall & Tweedy, architects, 96, Cavendish Street, London, W.1.

Middlesbrough.—Houses (14), Harrogate Crescent, for R. Thompson; Kitching & Co., architects, 21, Albert Road.

Morpeth.—Houses (154); R.D.C. surveyor.

Newcastle-on-Tyne.—Houses (24), Mountfield Gardens; Cunningham and Forster, builders, Kenton Lane, Newcastle.

Orpington.—Extensions to Council offices, Crofton Pound Hill (£28,000); R. Atkinson, architect.

Penryn.—Municipal Offices (£20,000); Cowell, Drewett and Wheatley, architects.

Preston.—Branch library, Broughton; S. Wilkinson, architect, County Offices.

Rochdale.—Houses (54), Halfacre Lane, Bamford, for H. S. Byrom, 27a, Yorkshire Street.

Rochester (KENT).—School, Cliffe Road, Frindsbury, for the E.C.; Read & McDermott, architects, 8, High Street.

Rothesay.—Houses (60), for the Corporation (£35,000); burgh surveyor.

Royton (LANCASHIRE).—Houses (118), Milton estate; U.D.C. surveyor.

Rugby.—Stores, Rokeby and Overslade Lane estates; Industrial and Provident Co-operative Society, Ltd., 45, Chapel Street.

St. Albans.—Houses (64), Redbourn and Sandridge; C. Huskinson, R.D.C. surveyor.

Sheffield.—Houses, Woodhouse estate, and Parson Cross estate; W. G. Davies, city architect. Factory, Beulah Road, for Geo. Bassett & Co., Ltd. Works, North Church Street, for Sheltons, Ltd., Queen Street; C. B.. Flockton & Sons, architects, 15, St. James Row.

Shipley.—Houses (22), Thornacre Road; A. Greenwood.

Skipton.—Houses (62), Short Bank Road; U.D.C. surveyor.

South Shields.—Motor garage; bor. engineer. Reconstruction of the Market Hotel; J. Jennings, contractor, 116, Alfred Street.

Spenborough.—Houses (86), Liversedge, for U.D.C.; J. Wallbank, architect, Church Street, Cleckheaton.

Stockport.—Houses (904), shops, and cinema, Longford Road, West Reddish; W. Farley, builder, Droylesden, Manchester.

Stockton-on-Tees.—Houses (18), Sudbury Road, for E. Benjamin; G. P. Stainsby, architect, 25, High Street. Development of 29 acres of land; borough engineer.

Stoke-on-Trent.—Development of Trent Farm estate; Adams & Edwards, architects.

Stourbridge.—Rebuilding of King's Hall Theatre; Poole's Theatre, Ltd., New Road.

Sunderland.—Houses (12), Prengarth Avenue, for J. Prentice; G. T. Brown and Son, architects, 51, Fawcett Street. Winter gardens and alterations to public library and art gallery (£50,000); J. E. Lewis, borough engineer.

Swansea.—School, Penclawdd; county architect, Glamorgan County Hall, Cardiff. Community centre (£15,193); G. Evans.

Tadcaster.—Houses, Swillington and Sherburn; R.D.C. surveyor.

Tow Law (Co. DURHAM).—Houses (32); M. Cordingley and McIntyre, architects, College Square, Durham City.

Tyldesley.—Houses (102), for the U.D.C.; E. Tonge and Sons, contractors, Station Road, Swinton, Manchester.

Uckfield (SUSSEX).—Houses (20), Buxted, Maresfield and Rotherfield; T. Burdett, R.D.C. surveyor.

Wingate (DURHAM).—School; F. Willey, 34, Old Elvet, Durham City.

Wolsingham (Co. DURHAM).—Houses (20), for Weardale R.D.C.; J. W. Walton, surveyor, Weardale Council Offices, Wolsingham.

Wolverhampton.—Factory, Aldersley, for Stoll Chair Manufacturing Co., Ltd., Switzerland; E. I. Warwick, architect, 25, Woodfield Avenue.

Worksop.—Houses (50), near Kilton Hill, for T. W. Coggan, Kilton Hill.

Worthing.—School, Dominion Road; school architect, Town Hall.

Wortley.—Houses (286); J. Gregory, R.D.C. surveyor.